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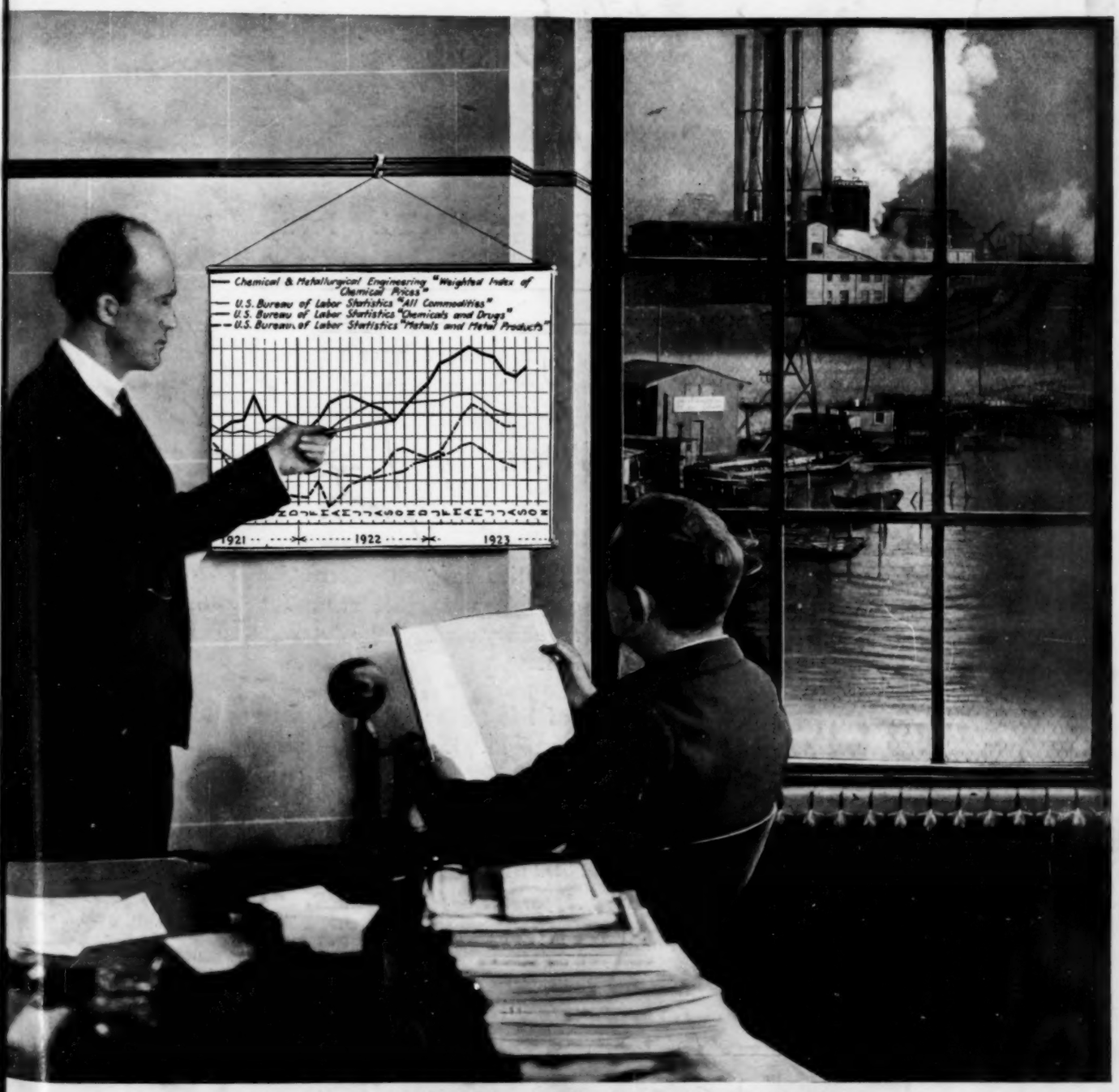
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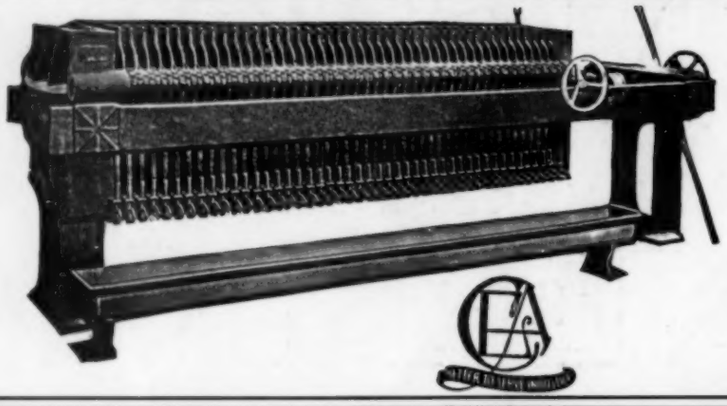

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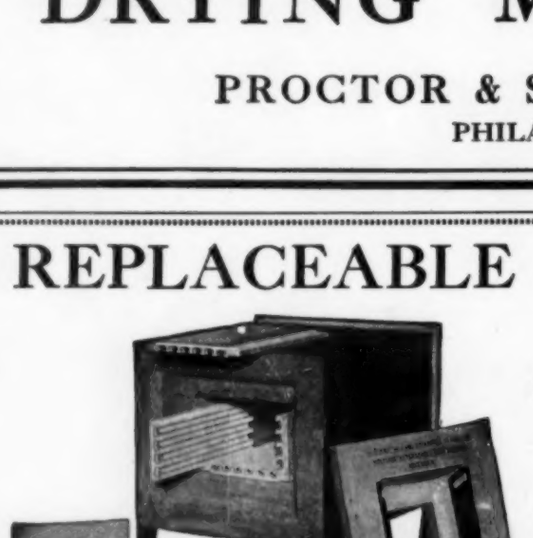

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H. C. PARMELEE, Editor

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Introducing a New Journalistic Venture

OF THE making of annual reviews there is apparently no end, and he is an intrepid editor who would needlessly add another to the lengthening list. But the chemical industry is not notable for its quantitative data on production, distribution, stocks and prices, and consequently offers a more inviting opportunity for journalistic enterprise in this direction. This is perhaps sufficient reason for *Chem. & Met.'s* first venture into a new field of endeavor, which is to become an annual feature of the magazine.

It has been our purpose to put unquestioned authority behind every statement and figure. This the reader will readily recognize in the trade reviews, written by men whose names are synonymous with their respective branches of the chemical industry. For the remainder, the staff has drawn upon its own intimate knowledge of the business as well as a wide range of other original sources. A special effort has been made to tell the story pictorially by graphs and charts. The net result is offered to our readers not only for its own intrinsic merit but also as a promise of successively better efforts in the years to come.

Distribution By Industries

WHEN our friends the economists get their first introduction to the chemical industry they are quite often dumbfounded by the striking paucity of statistical information. Particularly is there a dearth of figures bearing on consumption, even for the most important of our commodities. To be sure, consumption may be approximated with a fair degree of accuracy in a few instances where current statistics are available for production, stocks, imports and exports, but usually there is a gap somewhere along the line that makes this method unsatisfactory and therefore seldom used.

One purpose of the series of Annual Review Numbers initiated with the present statistical issue of *Chem. & Met.* will be to bring together from all available sources quantitative information on the consumption of industrial chemicals. This is practically a pioneer effort in a field that is deserving of intensive exploitation. With the exception of the Census Bureau's scattered references to "materials consumed" in a few of the more important industries, the only consistent attempt ever made to compile such data was that of the War Industries Board in 1918. It is convincing testimony of the importance of these data that the first request made by the army and navy of the industrial executives who had been called to Washington was for information regarding consumption in the industries of the commodities entering into the military program. Among these none was of more importance than chemicals, and the greatest credit must be given to those industrial leaders who, under war-time stress, succeeded in bringing together these valuable statistics. Unfortunately their effort was of necessity incomplete and besides there remains to the present-day student the difficult task of translating the results of their work into the requirements of peace-time industry.

Elsewhere in this issue will be found a number of analyses of the distribution by industries of such commodities as sulphuric acid, caustic soda, arsenic, bleaching powder, linseed oil, naval stores, sodium nitrate and sodium bichromate. Admittedly this is but the crude beginning of an effort which, with the co-operation of producers and consumers, we purpose to sustain and develop to greater usefulness for our industries.

A Banner Year In Coal Processing

MARKED progress was made in 1923 in the art and practice of obtaining useful products by processing coal. Of course it is true that this field is always one of the most active, for it underlies so much of industry that engineers have given it more than the usual quota of attention. But the past year shows advances greater than customary and which, in one case, occurred in a branch of the industry that had been in a static condition for some years past—water-gas manufacture.

This advance in water-gas manufacture is the general recognition and widespread adoption of the "backrun gas" process. This system was developed first several years ago on the Pacific Coast by George E. Whitwell and Daniel J. Young. A thorough trial was given it in that locality before any general publicity was sought. After the results obtainable had been determined and the Patent Office had allowed the inventors' claims, the performances of the test plants were made public (*Chem. & Met.*, vol. 29, No. 15, pp. 664-9). This system of making gas permits the use of bituminous coal in the water-gas generator and requires less oil for carburetion. Along with these benefits, the heat losses are decreased as compared with those of the standard water-gas set, and the deposit of carbon on the checkerwork of superheater and carbureter is prevented.

In the field of byproduct coking the outstanding feature of the year is one that holds great promise for the industry. The Becker design of coke oven (Koppers patents) proved so successful as practically to supersede all other types in the contracts let for new construction. This oven was first brought to the attention of the field in 1922, when an experimental plant of five ovens was erected at the works of the Chicago Byproduct Coke Co., and a large model was shown at the

Chemical Exposition in New York and elsewhere. This oven has proved to be a great advance in the art and has lessened the time required for coking sufficiently to decrease greatly the capital charges against coke and has at the same time extended the range of coals available for coking, as it will coke coals heretofore uncokable.

Low-temperature carbonization has been characterized in this country by a let-up in the invention of new systems. It has also been characterized by two events that promise soon to demonstrate what the future of this branch of the industry really is. First, Henry Ford has undertaken to build a number of units of the Piron type at his plant at Walkerville, Canada, and, if these are successful, other units at the plant at River Rouge. This should give this promising system a fair trial under the best auspices and demonstrate its worth once for all. Second, the Carbocoal system, with which such a brave bid for success was made at Clinchfield, Va., during the war, has obtained a new lease on life. A new plant, entirely redesigned in its essential features, is being constructed at Fairmont, W. Va. This plant is under the management of the Consolidated Coal Co., which has leased the rights of the owner, the International Coal Products Co., for a number of years. It is expected that the system will have an exhaustive test under the best engineering counsel obtainable; and here again the true utility of the low-temperature process should be demonstrated.

What Has Been Done In Heavy Chemical Technology

BY ANY criterion, whether of quantity or price, sulphuric acid is the most important heavy chemical. It is therefore interesting and significant that the production methods for this commodity, almost standardized for decades, should be the subject of so much research, promotion, study and discussion. The year 1923 may be a false signpost, but unless it is, we may expect radical and fundamental changes in sulphuric acid production within the next decade. At least five different processes have been brought out within the last 2 years, all of them aiming at a solution of the greatest drawback to sulphuric acid production—namely, the large initial investment. Several of these processes attempt to solve the problem by the packed tower method, in which small packed towers replace the monster chambers of orthodox practice. At least one process claims to produce sulphuric acid in good yield by replacing the chambers with ordinary ducts. Both of these systems should reduce materially the investment for a given plant capacity. None of the processes can yet be called technically successful, but where there is much smoke there must be some fire. It would be reasonable, therefore, to expect some interesting developments in this field.

Hydrochloric acid has been produced in several new types of mechanical furnaces and the absorption of the gases is being carried out commercially in the interesting Tyler-Vitreosil system.

Several new synthetic ammonia installations have been born and in general the operating pressures have tended toward higher levels than before. All of this fixed nitrogen work, whether with ammonia, nitric acid, cyanamide or cyanides, has unusual significance economically, and the rapid increase in the production of fixed nitrogen compounds is certain.

A number of complete processes are beginning to invade the industry—for example, the sulphuric and muriatic processes already mentioned and the Dorr processes for alum and for lithopone. This tendency is an interesting one and seems to be on the increase.

Many types of equipment have found wider use in heavy chemical production, particularly rotary filters and mechanical conveyors that tend toward continuous processes. New processes too are frequently encountered, although the conservatism of some industrial concerns has made it impossible to publish much of this material; and this in spite of the fact that the processes are frequently fairly well known among technical men. We believe that the recent activity in heavy chemical technology—and it has been marked—can be attributed to the influx of the technically trained production man. The past 5 years has been somewhat of a revolution in this respect in the heavy chemical field, though at first sight it might seem strange that the technical man did not dominate this branch of industry earlier.

Paint Industry Awake To Its Opportunities

DURING 1923 substantial gains have been made in the manufacture and distribution of paint and varnish through the splendid promotional work of the various trade associations in this industry. Advances in technology have not been so general, yet in some lines striking progress is reflected. Particularly stimulating has been the influence of the automobile manufacturer with his well-known methods of quantity production. To satisfy the demands of this industry there have been developments both in improved equipment, such as drying and baking ovens, spraying and dipping appliances, etc., and in new products replacing materials formerly used.

In the latter class are the new pyroxylin lacquer-enamels, for which the fields of application have recently been broadened greatly by improvements in technology. In the past the amount of solids—i.e., pigments and gums—that could be incorporated into the nitrocellulose solution has been so limited that several coats of lacquer were necessary to give a finish comparable with that obtained with ordinary color varnish. If the solids were increased beyond a certain point the lacquer became so viscous that it could not be sprayed. Thus was lost one of the principal advantages such a product has over a finish that must be applied with a brush. The solution of the problem has come during the past year largely through research on the physical and chemical properties of the constituents that enter into the mixture—namely, the nitrocellulose solution, the gums, pigments and solvents. Chemical engineering has played an important part in developing the methods and equipment for preparing this material and properly incorporating them into the finished product.

It is difficult, if not impossible, to predict just how broad will be the ultimate field of application for these products. Already considerable progress has been made in the automobile industry; a recent article in the literature indicates that in one of the largest automobile factories the use of the new finish has reduced the total number of operations by 33⅓ per cent. Unit labor costs were reduced 50 per cent, and at the same time the capacity of the plant was doubled. Along other lines the progress of the new finish may not have been so spectacular, but there can be no doubt that the pyroxylin product is making notable gains in the finish-

ing of furniture and the wide variety of wood and metal articles requiring a quick and durable finish.

Any review of the technical developments in the paint and varnish industry would not be complete without mention of the fundamental work that has been done by the standing committees on preservative coatings of the American Society for Testing Materials and in the co-operative laboratory maintained by the Paint Manufacturers Association. The lead and zinc pigment makers through their own progressive research laboratories have also made valuable contributions to our basic knowledge of these materials. Among recent manufacturing developments should be noted the production on a commercial scale of electrolytic white lead and the growing use of titanium pigments. Still another step in the direction of progress is the movement now under way for the formation of a paint and varnish section of the American Chemical Society. These developments selected at random from one of the largest of the chemical engineering industries are sufficient evidence to show that the industry has awakened to its opportunities of technical as well as commercial progress.

Doing Your Share Of an Important Job

JANUARY is far from a happy month for the average chemical manufacturer. Between inventories and new contracts, annual statements and assessments, he is apt to find business just now considerable of a burden. And when the Census Bureau adds to that burden with its detailed request for information regarding 1923 production, there is naturally a strong temptation to disregard the whole thing, to pigeonhole the census schedule for "attention later."

The manufacturer who yields to this temptation, however, is guilty of contributing to the unnecessarily long delay that sometimes occurs in the compilation and publication of valuable statistics of business. Furthermore, his lack of interest is costly to the government, for the bureau is forced to send additional letters and telegrams to arouse him from his lethargy. Failing in this, a special agent is sent, armed, if necessary, with the legal levers that can pry loose the desired information.

The Director of the Census has done everything in his power to make the bureau an efficient and valuable adjunct to industry. He has ordered the immediate tabulation of all reports as rapidly as they are received and has given authority for the publication of the preliminary totals within a few days after the receipt of the last report. He has co-operated with our trade associations in preparing schedules that will yield the maximum amount of information with the minimum of effort in translating the data from the usual production records of the industry. And as a further example of the director's willingness to be of service to our industries he has given his whole-hearted assistance and that of his bureau to the editors of *Chem. & Met.* in their present effort to bring before our readers the latest official information on production and consumption in the chemical engineering industries.

The most appreciated way in which industry can show its gratitude to the Census Bureau is to see that the 1923 reports are filled out immediately and mailed promptly to Washington. This effort will be returned many-fold in building up a valuable statistical service.

A Balanced Program For Our Dye Industry

WHERE do we stand in the dye business? Is our industry going ahead, standing still or losing ground in its war of independence? These questions are asked us so often—sometimes by persons better equipped than ourselves to answer them—that we have been tempted to make a study of the dye situation and its developments during 1923. We find that when the year started our industry was producing 93.5 per cent by quantity of the dyes consumed in this country. In arriving at this figure consumption was assumed to be the quantity obtained by adding the imports to the domestic production and subtracting the exports from this sum. The imports during 1922 proved to be 6.2 per cent of the total production by quantity and 6.5 per cent of the consumption.

In the year just passed perhaps the most striking development has been the tremendous gain in export trade, indicating the trend toward regaining the prominence in foreign markets that American dyes held during 1920. One of the major reasons for this, of course, has been the fact that the French occupation of the Ruhr has cut off the German industry from profitable markets in China and the Orient. The American industry, which had the pleasant experience of supplying these markets during and immediately after the war, was quick to grasp the opportunity of returning to them. Whether or not this export trade will be permanent must remain an open question, particularly in view of the fact that the output of dyes in the German plants reporting to the Reparations Commission has increased from 9,140,178 lb. in September to 14,475,872 lb. in November, 1923. Imports of coal-tar products during 1923 at first glance would seem to indicate a considerable increase. However, closer study indicates that the bulk comprises imports of creosote oil. During the first 9 months of 1923 this commodity constituted 87 per cent of the total importation of crude coal-tar products and 58 per cent of all coal-tar products. There can be no doubt that the importations of dyes and other finished coal-tar products during 1923 were considerably less than in 1922, the last year of license control. This, therefore, testifies to the effectiveness of the new tariff law and the provisions and regulations under which it has been administered.

The gap to be filled by the domestic dye industry is restricted to the production of a comparatively small number of dyes used in any considerable tonnage and a wide variety of special colors that are used only in very minor quantities. It may safely be concluded that the production of twenty-five colors not now made in this country would reduce our imports to a negligible quantity on the basis of both tonnage and value. Three or four colors would probably reduce imports by 50 per cent.

Among the vat colors the principal needs have been for Indanthrene Golden Orange R and G and for the vat pinks, since practically all of the other important dyes of this class are being produced in a considerable quantity. The Golden Oranges R and G have had the attention of our manufacturers for several years, but apparently as yet the makers have been unable to overcome production difficulties. It is reported that the British have worked even longer without succeeding in getting their yields and costs on a competitive basis. Of the vat pinks, one is now being produced in this

country under the name of Sulphanphrene pink FF. Some difficulties were encountered when this was first put on the market, but it is our understanding that these have since been overcome and that commercial production of this color on a considerable scale is now progressing smoothly.

During the year a number of special colors, most of them small tonnage products, have been reported by the domestic manufacturers. These include new dyes for silk, cotton, wool and paper. Much work has also been done on the true alizarine derivatives which are of major importance for fast shades on wool. When the true alizarine blues and blacks are brought to their maximum production, it is certain that there will be a considerable reduction in imports.

There can be no doubt that the prime consideration in the future development of the American dye industry is for a balanced program of production. Too little attention and study have been given to the problem of meeting 100 per cent of the domestic requirements and of eliminating much of the duplication in effort through which certain dyes are made by many manufacturers, whereas others are not made at all. This situation rights itself to some extent because of the natural tendency for larger plants to produce the bulk of colors, leaving the small-tonnage products for the small producer. However, it offers an inviting opportunity for the smaller manufacturer, who is thus able to specialize on a few closely related products and give them the careful study needed to raise quality and yields to a profitable competitive basis.

Rubber Industry Progress Reflects Fruitful Research

IT IS difficult to estimate the ultimate effect of the advances in technology made in the rubber industry during the past year. Great strides of immediate and vital concern have been made in the use of such organic accelerators as thiocarbanilide through which the time required for vulcanization has been generally decreased —as much as a third—with proportionate increase in plant capacity. Further the cold or two-gas method of vulcanization using hydrogen sulphide and sulphur dioxide, which has been applied successfully to linoleum fabrication, gives promise of broader application in other lines. Another indication of progress appears in the improved quality of available pigments. The combined effect of decreased time of vulcanization and better pigments has made possible much more satisfactory coloring of rubber products.

Without doubt the development in latex technology to a point where the commercial utilization of this substance is feasible constitutes a step that will have far-reaching consequences. This makes possible a modification of many well-established methods and also facilitates the introduction of rubber into new industries for which its unusual properties render it peculiarly suitable as a raw material. It has been said by some that the rebirth of natural latex—Brazilian natives first used it long ago—marks the beginning of a new epoch in the rubber industry comparable with that which originated in Goodyear's discovery of vulcanization. While this may be true, the advent of the water dispersion process for rubber coagulated and mixed in the older manner makes it seem highly probable that natural latex will at least have a competitor in its future development. Spray-dried rubber, made possible by the vision and foresight of Ernest Hopkinson, also seems certain to take its place in commerce.

For heavy goods it is of course possible that latex, either natural or from a dispersed coagulum, will replace the original crude; but for light-weight products and for fabric impregnation latex has already proved its adaptability and has demonstrated economies. As a binder, filler or adhesive it is certain to find new uses in many industries—uses that are now but a matter of conjecture. It is safe to say that latex is at present in the early infancy of its commercial existence, that 1924 will mark further strides in its use and that organized research will continue to pound away along much the same lines that have witnessed remarkable progress during the past year.

A Census of Opinion On Petroleum Progress

NOT content with our own notions regarding the penetration of technology into the oil business, we decided recently on a little editorial experiment. On the assumption that the industry knew more about its own troubles than some of the rest of us, we picked out a score or more of representative petroleum technologists and asked them two simple questions—viz., (1) What was the most significant accomplishment in the industry during 1923? and (2) Along what line can we look for future progress? There was a very gratifying response to our inquiry and fifteen of the answers were complete enough to prove useful for purposes of comparison.

In response to our first query there were seven who held that recent developments and improvements in cracking processes constituted the industry's most striking advance in technology during 1923. There were three who would give the honor to the anti-knock compounds, particularly the commercial production and distribution of "ethyl-gas." Two believed that improvement in the distillation process with resulting better fractionation should be given most credit. Two other of our friends (and we are forced to admit that their main interest is not in motor fuel) pointed to the recent advance in reclaiming lubricating oil by means of centrifugal separation. And finally there was one who would have us believe that the prevention of evaporation losses in storing and handling volatile products should receive the editorial palm.

When it came to prophesying the direction of future advance, we found even greater diversity of opinion. One-third of our fifteen co-editors maintained that economic stabilization of the petroleum industry is paramount to any worth-while improvement, whether technical or otherwise. There were three who expected further and immediate advances in cracking processes, and there were two who looked for most progress in the reduction of losses by evaporation. Curiously, there were four votes for distillation—one was for improvement based on the use of rectifying columns to give true fractional distillation rather than fractional condensation, another looked to continuous distillation of crude oil, and two were most enthusiastic about the vacuum distillation of lubricating and other heavy oils. The fifteenth reply to our second question emphasized the growing demand for fuel oil for domestic and industrial uses and predicted that during the coming year it would have most influence on the industry.

The obvious and most encouraging comment on these results from our point of view is the predominating proportion of these problems that await solution at the hands of the chemical engineer. Particularly inviting to the technical man are the two subjects of cracking and distillation.

The prominence gained during the past year by some of the newer cracking processes—including among others the Dubbs, Fleming, Cross and Ellis—and the greater yields from the older processes such as the Burton and the Holmes-Manley may well be cited as chemical engineering accomplishments. Their real significance may not be immediately apparent because of the present overproduction of crude oil, but when this situation rights itself, there will be an even greater need for cracking in order to keep gasoline production in pace with consumption.

Here is a chemical engineer's comment on the possibilities of improving the petroleum industry's application of one of the oldest of our unit processes: "Rectifying fractional distillation has been almost unknown in the oil industry until recently. Within the last few years some of the largest companies have used bubbler cap columns, but most of the oil is distilled in the old way, using some type of dephlegmator or "tower" on the still. A change is at hand. The industry is waking up to the fact that fractional distillation is thermodynamically a more efficient process than fractional condensation. Larger yields of a better product can be obtained and at the same time the cost for fuel will be reduced if fractional distillation is substituted for dephlegmation."

There are many other interesting high spots in our correspondence which only a lack of space compels us to set aside for later publication. However, the bare statistical results of the inquiry are sufficiently conclusive, we believe, to show a most encouraging penetration of technology into one of the largest of the country's great industries.

Recent Progress Indicates Future Changes in Fertilizer Technology

WHEN we speak of fertilizer, we automatically include a vast variety of materials and processes. Therefore any query as to the progress in fertilizer technology impinges on the one hand on the manufacture of sulphuric acid and on the other on the dry rendering of fat.. It may equally embrace fixation of nitrogen and potash from kelp. There are several broader subjects, however, that have interested the whole industry.

Perhaps the most widely discussed problem relating to technology is the production of phosphoric acid from phosphate rock in the electric furnace. Accordingly the work of the Federal Phosphorus Co. is being watched with great interest. Will this product eventually compete with acid phosphate as a fertilizer material? It is difficult to say. At present the nays have it, but the process is still young in years.

In discussing heavy chemicals we have already mentioned the developments in nitrogen fixation and in sulphuric acid. Acid phosphate production has not changed. It already enjoys a mechanical perfection and chemical control that are of a high order. Progress is likely only in the event of a complete change in process or in the better recovery of byproducts such as hydrofluoric acid.

No discussion of fertilizer would be complete without mentioning the progress made in the direction of limiting the number of mixes on the market. Many of the more important fertilizer states have decided on ten or a dozen mixes that would be of most use to the farmers in those states. This is a progressive move in the direction of national economy and eliminates largely the unscientific caprice of the individual buyer as well as the "tailor-made" mixes that have been the bane of the fertilizer manufacturer. Such a move inevitably improves conditions and control of operation. It is finally worth noting that these mixes all show a tendency in the direction of high-analysis (concentrated) fertilizer.

Progress in the Refractory Industry

CLOSER co-operation between producer and consumer may be taken as the outstanding feature of the refractory industry for 1923, since much of the work in progress is destined to have an important influence on technology. This is particularly true of the service classification plan for refractories developed by a special committee of committee C-8 of the American Society for Testing Materials; the co-operative study of metallurgical requirements for refractories started by the Refractories Division of the American Ceramic Society, valuable assistance being rendered by the Bureau of Mines; and the comprehensive survey of service conditions being made by the industrial survey committee of the Refractory Manufacturers Association. All of these investigations will undoubtedly indicate methods whereby the manufacturer can improve his produce so as to give better service.

Of still more direct influence on technology were the studies on burning practice made by the crew of the Bureau of Mines specially equipped car right at the kilns of a number of refractory manufacturers, and the adaptation of the Gates kiln-firebox stoker to the burning of refractories in round down-draft kilns. Much has been said about the desirability of having the maximum possible brick-to-brick contact in refractory settings, and it is interesting to note that near the end of the year a large producer announced that it was ready to market firebrick of superior uniformity.

These in brief were the accomplishments during the past year. There is abundant evidence of a spirit in the industry which promises even greater progress in 1924.

Legitimate Activities Of Trade Associations

LINK the simple word "statistics" with the harmless expression "trade association" and you have a combination that sends a shudder down the spinal column of business. There can be no dissension from Mr. Hoover's statement that the right of trade associations to gather and distribute statistical information is an all-absorbing question that daily becomes more and more acute. Certain recent activities of the Department of Justice have cast a pallor of uncertainty over the situation, while late decisions, notably the consent decree in the case of the United States vs. the Tile Manufacturers' Credit Association, have had the effect of further complicating rather than clarifying the law that defines the legitimate activities of organized business.

If we are able to read aright the trend of recent

developments, the whole problem turns on the nature and use of the assembled data. There is nothing in the recent correspondence between the Secretary of Commerce and the Attorney-General that is not distinctly encouraging to the association or industry engaged in bringing together current statistics of total production, stocks, average prices, etc. Mr. Daugherty himself recognizes that an important distinction can be drawn between two types—good and bad, if you will—of statistical information. He writes:

"In my judgment the effect of general information as to the condition of an industry, such as the total production, shipments, stocks on hand and the average price, or range of prices, is entirely different from that resulting from each person engaged in an industry receiving directly, or through a common medium, reports which reveal to him the exact condition of the business of all of his competitors."

This distinction stands out in the experience of all of us if we are but willing to recognize its existence. For example, before us on our desk today is the daily report from the secretary of an association of commodity manufacturers, which shows for the preceding day the detail of every individual sale made in the United States by every member of the association. The states in which the purchase is made and to which the shipment is consigned, the exact quantity and detailed description of the merchandise, the prices obtained, the freight allowed and the terms of sale—all are tabulated and laid before the members for guidance in the conduct of their daily business. There is no doubt, in our minds at least, that this is the sort of trade association activity that is now, and should continue to be, under ban. Equipped with confidential information of this sort, each member "is invited and naturally inclined to imitate the conduct of his most successful competitor." This may or may not be price fixing, but certainly it is a long step away from the free competition that puts buyer and seller on an even basis in their ordinary business relations.

Contrast this situation, if you will, with the estimable statistical work of some of our outstanding organizations such as the American Iron and Steel Institute or the American Petroleum Institute. These associations bring together the basic statistics of these two great industries, combining them in the form of totals and averages and making them available on equal terms to everyone. Current data on production of steel ingots or the production and stocks of crude oil are of great value not only to the limited number who in the course of daily business must judge and interpret market conditions for steel or oil, but also for the greater number of business men who study the trend of our basic industries and watch in them the operation of the great economic law of supply and demand. A ban on statistical work of this sort would mean the return to the dark days of guesswork, speculation and unscientific business methods.

It is most fortunate, therefore, that the Department of Justice recognizes the great distinction between these legitimate activities and those that have for their tacit purpose price fixing, restricted production or other unlawful restraints to free and natural competition. Those who are inclined to a more pessimistic view of the situation argue, with some measure of persuasion, that if the decision in the case of the tile manufacturers actually expresses the policy of the Department of Justice, then industry may well be apprehensive of future developments. It should not be overlooked, however, that this decision is a consent decree, binding only to the two parties involved, and establishing a legal precedent only in the sense that it expresses the present attitude of the office of the Attorney-General. It is indeed questionable whether any judge would impose or any association accept such drastic restrictions unless there were admitted the most flagrant violations of the existing laws of commerce and trade.

It is our sincere belief that these developments do not give cause for concern to any legitimate organization that collects and distributes the general statistics of an industry. These statistics are as much as part of modern business as is the progress of production and consumption which they record. They are instruments that serve industry as a whole. Public opinion will not for long countenance any attempt to make them subserviant to bureaucratic autocracy.

Chemical Engineering Benefits The Pulp and Paper Industry

A WHOLESOME sign of sound technical progress has appeared during the past year in the pulp and paper industry. There is ample evidence that the fraternity of chemical engineering industries is becoming recognized in that quarter, and that those responsible for technical development are coming to seek the benefits of membership in that fraternity. Past growth has been along lines largely empirical; development has been that of the art rather than that of the science; progress has come perforce from within rather than from without. Hence we have noted with pleasure during the past year that many mills have shown a distinct tendency to apply new principles to old problems and that these new principles have been the fundamentals of chemical engineering.

Possibly the first Paper Industries Exposition, held in New York in April, played a part in the developments we have noted. Many makers of chemical engineering equipment had exhibits there and for the first time the men of the industry had opportunity to see a special array of chemical engineering equipment applicable in their mills. However large or small the part played by that exposition in reinforcing the present trend, there can be no doubt that it actually exists. Two promising advances have been made in soda mills using equipment formerly considered outside the domain of such a plant. Continuous caustic liquor production has begun to displace the old tank system and continuous suction filters have been used to wash the black liquor out of pulp, with results that point to a much wider application of such equipment. The first save-all to be used on pulp recovery, based on the principle of the continuous thickener long used on metallurgical slimes, recently went into service and has proved successful. The sulphite mill has hitherto wasted an immense amount of heat in digestion, but by the Decker process, which has been tried out during the year, a saving of 30 to 40 per cent of this heat may be effected.

The equipment and principles that have made possible these developments are clearly the outgrowth of chemical engineering, and the movement started several years ago by a few chemical engineers who earnestly applied their training to the problems of the industry has at last begun to bear fruit, to have a snowball effect. Inertia is being overcome and the movement grows apace. Such a trend is significant both to the men in the mills and to chemical engineers at large. It denotes the definite addition of a new member to the fraternal circle of chemical engineering industries.

Brightening Outlook for American Dyes in 1924

The President of
E. I. du Pont de Nemours & Co.,

Irénée du Pont

Predicts that 1924 "will see the development of most of the complex vat colors and of the specialties for which we are now going abroad. Manufacturing methods are being improved, confidence in the American product is becoming firmer and altogether the outlook is extremelybright."

MARKED progress was made in the development of a self-contained American dye industry during the year 1923. Many problems which the American producer had faced were solved and the year ended with the industry in a substantially better position than it was at the beginning.

Reports showing actual production in pounds or increased production in varieties are not yet available, but custom house figures prepared from month to month show that imports of dyes have decreased steadily. This fact and the fact that the American consumption of dyes has increased greatly tell the story of increased output from American factories. American consumers have found it necessary to go abroad for comparatively small quantities of a few colors and for some specialties which the American producer has not yet developed.

Passage of legislation which fixed tariff rates on chemical products put the American producer in the position of knowing what to expect, whereas in former years there was such uncertainty that capital was timid about going into the industry.

In the early months of the year the consuming industries were at the peak of production and their demands for dyes were therefore greater than before. These demands were met without delay by the American dye manufacturers, which is the best of evidence that the industry has made good and has relieved American consumers of the danger of ever again being in the power of foreign manufacturers.

The bogy of monopoly, which opponents of the dye industry's development had paraded before members of Congress, has been effectually laid. Keen competition between domestic manufacturers has continued. With production facilities expanded, prices were progressively reduced in virtually all lines. Improved mnaufacturing methods and the general advancement of the art led naturally to these reductions. In some cases, however, competition has become so keen that prices are below the point at which it is profitable to do business.

The recent federal court decision in the Chemical Foundation suit, which assures safety to American licensees under former German patents from the old-style German competition, will give greater impetus to the industry and will improve the morale of the men engaged in it.

It is a safe prediction that the present year will see the development of most of the complex vat colors and of the specialties for which we are now going abroad. The research laboratories are functioning better every day, organizations are being strengthened, manufacturing methods are being improved, confidence in the American product is becoming firmer, and altogether the outlook for the future is extremely bright.

Production, Imports and Exports of Dyes and Coal-Tar Chemicals

Production of Dyes and Coal-Tar Chemicals, 1919-22

	1919			1920		
	Number of Manufacturers	Production Lb.	Production Value	Number of Manufacturers	Production Lb.	Production Value
Intermediates	116	177,362,426	$63,210,079	119	257,726,911	$95,291,686
Finished products	155	82,532,390	84,585,544	161	112,942,227	112,731,547
Dyes	90	63,402,194	67,598,855	82	88,263,776	95,613,749
Color lakes	34	7,569,921	4,179,964	43	10,983,538	5,871,820
Photographic chemicals	10	335,509	1,059,340	8	440,759	1,015,848
Medicinals	31	6,777,988	7,883,071	35	5,184,989	5,726,776
Flavors	9	610,825	1,318,654	15	166,884	527,493
Perfumes	6	41,419	164,302	12	99,740	332,008
Tanning materials	1 }	3,794,534	2,381,358	4	3,142,861	233,674
Synthetic phenolic resins	5 }			4	4,659,680	3,410,179

	1921			1922		
	Number of Manufacturers	Production Lb.	Sales Lb.	Number of Manufacturers	Production Lb.	Sales Lb.
Intermediates	108	70,899,912	33,637,326	106	165,048,155	58,004,435
Finished products	147	51,457,565	60,434,009	164	88,368,131	93,370,065
Dyes	74	39,008,690	47,513,762	87	64,632,187	69,107,105
Color lakes	43	6,152,187	6,424,612	43	10,578,664	10,366,676
Photographic chemicals	5	183,798	170,221	7	345,798	347,647
Medicinals	34	1,545,917	1,876,246	35	2,946,347	3,092,915
Flavors	17	901,245	933,662	20	1,215,668	1,278,857
Perfumes	15	119,335	119,691	17	793,148	778,696
Tanning materials	4	1,902,597	1,721,359	4	1,910,519	1,981,588
Synthetic phenolic resins	3	1,643,796	1,674,456	5	5,944,133	6,415,931

(Source—U. S. Tariff Commission census of Production.)

	Total Exports Dyes and Dyestuffs		Total Imports Colors, Dyes, etc.	
1922	Value		Quantity, Lb.	Value
January	$657,042		$360,457	$377,662
February	337,826		268,341	289,672
March	498,274		345,296	471,443
April	345,550		386,221	621,845
May	306,938		283,355	420,580
June	345,578		375,863	620,975
July	420,805		208,575	299,518
August	464,273		312,107	495,547
September	373,727		519,148	895,866
October	452,498		237,832	290,861
November	483,264		290,681	390,634
December	512,619		209,846	322,409
1923	Value		Quantity Lb.	Value
January	400,069		386,728	511,963
February	516,227		286,097	376,261
March	588,675		318,950	416,469
April	574,462		288,937	414,946
May	578,707		294,555	388,339
June	466,154		210,451	275,970
July	835,972		160,940	236,777
August	416,032		279,708	319,648
September	447,869		173,978	227,936
October	535,049		286,256	475,547
November	433,892		318,064	463,810
December	.....		.....	.....

(Source—Dept. of Commerce, Monthly Summaries.)

The President of the Mathieson Alkali Works

E. M. Allen

Says: "The year 1923 saw the largest step yet taken in the replacement of bleaching powder by liquid chlorine. The manufacturer who has not rearranged his plants accordingly now faces a situation that is bound to become quite serious."

Liquid Chlorine Is Fast Replacing Bleaching Powder

NO BRANCH of the heavy chemical industry has undergone such radical changes in the past 2 or 3 years as the electrolytic manufacture of alkali. The year 1923 saw the largest step yet taken in the replacement of bleaching powder, which is known commercially as "bleach," by liquid chlorine. It is safe to say that in 85 to 90 per cent of all places where bleaching powder was or is used it can be replaced by liquid chlorine and show a material saving. The manufacturer of electrolytic alkali who has not realized this situation and rearranged his plants accordingly now faces a situation that is bound to become quite serious.

This change is a very costly one to make, as it means the scrapping of the expensive lead-lined bleach chambers and the installation of expensive liquefaction plants for producing liquid chlorine from the chlorine gas that went to make bleach. These expenses are very heavy, but a still greater expense in such a change is the purchase of the equipment necessary to insure safe shipment of liquid chlorine.

The question of storing bleach in warm weather is a serious one, both on the part of the manufacturer as well as the customer. Buyers, realizing this, have taken advantage of the situation to depress bleach prices each summer. This situation was made easy on account of the manufacturers' fears of their stocks going bad during the hot season, and their desire to get rid of surplus stocks, often much below cost.

It is true that the manufacturers of dyes and other organic chemicals in American plants are a bulwark for national defense, since these organic chemical plants can readily convert their equipment for the manufacture of military gases, but this is even more true of the chlorine industry, since chlorine is indispensable for the manufacture of all of the known important war gases. The transportation problems having been worked out, it is possible now to deliver this raw material (chlorine) to any point where war gases can be manufactured in the dye and similar chemical plants. In connection with the national defense, no chemical industry should receive more consideration than the electrolytic alkali industry.

In the not distant future we shall find synthetic ammonia manufactured at most of these plants, on account of the pure and cheap hydrogen produced. This production has already started at the Niagara Falls works of the Mathieson company, which for several months has been producing a fine quality of synthetic ammonia by its own process. This company is rapidly enlarging its ammonia plant, that it may utilize all of its waste hydrogen in the production of anhydrous ammonia. An Italian company is also installing a plant at another electrolytic alkali works at Niagara Falls, and this should start operations this coming summer.

In 1918 the liquid chlorine capacity of this country was about 7,900 tons per year (equivalent to approximately 23,700 tons of bleach), the large percentage of chlorine then going into bleaching powder. Jan. 1, 1924, the liquid chlorine capacity of this country was approximately 33,000 tons per year (equivalent to 99,000 tons of bleach), which shows the increasing consumption of liquid chlorine in replacing bleaching powder. The Niagara Falls plant of the Mathieson Alkali Co. is the largest producer of liquid chlorine in the world, now producing over 18,000 tons per year.

This large-scale production has naturally brought up the important question of safe transportation, and great credit is due the manufacturers, assisted by the government and railroad officials, for having worked out this problem. Liquid chlorine is now shipped in 100-lb. and 150-lb. cylinders to small consumers; while shipments to large consumers are made in 1-ton (2,000-lb.) containers; in tank cars holding 15 tons in one tank; and in multi-unit tank cars, consisting of a specially designed car, securely holding fifteen 1-ton (2,000-lb.) containers, all of which can be taken off at destination, and empties returned to the works, where they are thoroughly cleaned and inspected separately.

Developing New Outlets—Research work is being continually carried on to find new uses for chlorine, and one of the largest outlets that has recently been developed is in the refining of gasoline by the hypochlorite process. By this process virtually all the obnoxious sulphur content is eliminated, and the gasoline so refined will stand storage and keep sweet. Furthermore, the refining can be done at a material saving over the acid process. At the present time this process is installed in thirteen refineries, and five more refineries will make installations during January of this year. There is also a large tonnage used in water purification and sewage disposal, outlets that are bound to develop a still larger use in time.

Naturally the largest outlets for chlorine are in the pulp and paper trade and in the textile industry. About 65 per cent of these industries have replaced bleach with liquid chlorine. Dependent on the efficiency in the handling of bleaching powder by the consumer, the price of bleach is to the equivalent price of chlorine as 3.0-3.5 is to 1.0. That is, if bleach sells at 1.5c. per pound, the consumer shows a saving and is justified in paying 4.5c. per pound for liquid chlorine.

The outlook for 1924 is good as to tonnage, but the regrettable cutting of prices during the contracting season cannot help but affect 1924 profits to a certain extent.

Trade Abuses Hamper the Insecticide Industry

The Manager, Development Department, Sherwin-Williams Co.

Frank Hemingway

Declares: "It is to be hoped that in 1924 we shall see some trend toward stability in the markets for the raw materials and, above all, some effort made to eliminate the present bad business practices in the marketing of insecticides."

THE manufacture of insecticides is still the red-headed stepchild of the chemical industry. Stunted in growth, forced to answer everyone's beck and call and blamed for everything that goes wrong, surely the lot of the industry is not a happy one. The market for its most important raw material, white arsenic, is wildly speculative and terribly unstable. Manufacture is not easy. It must be conducted to conform absolutely to the requirements of the Department of Agriculture and other governmental bureaus. The item of occupational diseases is a serious one and the greatest care must be exercised.

But it is in the sale and distribution of his product that the manufacturer meets his most disheartening difficulties. His sales estimates must be made up months ahead of the country's requirements, not only as to tonnage of the dozen or more different products but also as to the actual sizes and styles of packages that may be the fashion in the coming season.

It is discouraging for a manufacturer to study his yields and manufacturing costs with the possibility of saving a minute fraction of a cent a pound when he is face to face with the fact that after his product leaves his factory there is added to its cost upward of 35 per cent to cover freight charges and other distributing and handling expenses. In other words, if the manufacturer nets 13c. per pound for calcium arsenate f.o.b. factory, the ultimate consumer will have to pay in the neighborhood of 20c. per pound. The reason for this spread is not hard to find. Although the goods are sold months ahead of shipment, the buyer still wants to have a billing date some weeks after the shipment, and he still insists upon long terms. It is a mystery why the insecticide industry continues these evil practices. There is no reason why all of these trade abuses should not be replaced by good business tactics.

Calcium Arsenate, the Temperamental Feature—Any review of the insecticide industry during 1923 must of necessity give attention to calcium arsenate, which, judging from the publicity it has lately received, figures in every phase of our social, economic and national existence.

Much confusion was caused in this industry when one of the more important cotton states announced that it had contracted with a Western concern for an enormous quantity of calcium arsenate at 10c. per lb. This fixed in the minds of the buyers throughout the South generally that 10c. was a proper price. As a matter of fact, calcium arsenate cannot possibly be made and sold at that figure with the market for raw material anywhere near its present level. These announcements were scarcely off the press before it became known that the whole transaction was a fiasco and that no white arsenic or calcium arsenate would or could be forthcoming from this source. But this was just one of the difficulties the calcium arsenate manufacturer was up against.

Toward the end of the year an effort was made to place calcium arsenate on the free list. To the best of my knowledge the calcium arsenate manufacturers took no action either jointly or individually to combat these measures. Practically all of the larger manufacturers felt that the boll-weevil menace was a national issue and that the protection of labor involved in the manufacture of the poison was negligible as compared with the value of the crop to be saved. However, there can be no doubt that the cotton states should be congratulated upon the fact that none of these measures passed.

Nicotine Invites Research—Nicotine, in any form, is naturally an expensive product, and during 1923 this seemed to present an interesting field for research. The supply of tobacco stems and trash is limited, and a great deal of raw material must be handled to produce comparatively small quantities of the product. There is little doubt that a wholly efficient substitute for nicotine, whether it be a product similar to phenyl ethyl alcohol or a pyridine derivative, or a new departure altogether, would be a most valuable addition to the list of available insecticides.

Arsenic and Arsenicals—Several insecticide companies have made investigation in various parts of the country with a view to increasing white arsenic production. If the white arsenic market does not reach some degree of stability at reasonable prices in the near future, it is safe to assume that white arsenic plants will be installed and operated by insecticide manufacturers working individually or jointly with others.

It is hard to conceive of any great improvement in the manufacture of arsenicals as conducted by the larger chemical companies. At present the starting point in the manufacture of all arsenates is, naturally, an arsenic acid plant. Stoneware apparatus and hand operations are now practically things of the past. The raw material is fed automatically and continuously into the oxidizing apparatus; and the recovery system, which is patterned on the best practice in the explosives industry, works at maximum efficiency and also automatically. The radical changes which I formulated 5 years ago in the New Jersey plant stand today both as to design and flow sheet.

While it may be that in the immediate future the industry will make some gain by increasing its manufacturing efficiency, there can be no doubt that it is in the field of distribution and credit that the most progress must be expected.

Outlook for Methanol and Acetate of Lime Is Encouraging

W. S. Gray, Jr.,

Of W. S. Gray & Co.

Says: "Due to the financial and political conditions abroad and to the uncertainties of future legislation in our own country, it takes a brave man to prophesy far ahead, but I can find no reason why business in this line should not continue active for at least the first part of 1924, if not for the entire year."

THE year 1923 has passed into history, in so far as direct wood-distillation chemicals are concerned, as a good example of a normal year. The output of the three main products—namely, acetate of lime, crude methanol and charcoal—was large, and the volume of sales encouraging, with the result that the plants properly located and efficiently managed have shown satisfactory results.

The production of acetate of lime amounted in round figures to 70,000 tons and the total sales for the period just slightly less. The new year came in with only a reasonable inventory on hand and the demand for the product quite strong. Prior to the war about 40 per cent of the entire production was exported, and although this outlet has been shut off to a large extent, due to unfavorable conditions abroad, it is gratifying to note that the domestic market has absorbed the difference. Furthermore, this has been done in spite of the competition resulting from the manufacture of acetic acid by the synthetic process in Canada, Germany and Switzerland, and the acetone made in large quantities in this country by the fermentation process as a byproduct of butanol.

In a like period there was produced about 7,000,000 gal. of crude methanol, most of which was readily marketed. There has been a large increase of late years in the use of the refined grade of this product for the manufacture of formaldehyde in this country, and the larger inventory is due only to the fact that conditions were such in Germany and on the Continent (a market which prior to the war was a very large one) that the exports to that quarter amounted to but a small percentage of their former requirements. For some months past the demand has been equal to if not greater than the production and the outlook for the future seems promising.

The charcoal production was, of course, correspondingly large and the demand for the first half of the year was excellent. During this period the charcoal pig iron business was active and large quantities were consumed for that purpose. During the last 6 months, however, the demand fell off, and at the end of the year there was a larger inventory and a weaker market. Undoubtedly the mild winter that we have had up to date has not been favorable for the sale of this product, but as it is a stable article of commerce, the demand will doubtless pick up and again take the entire production.

While it is true that the prices prevailing for these products are higher than they were prior to the war, it must be remembered that the cost of production, upkeep, machinery, labor, freight rates, etc., has at least doubled, and then too it must be borne in mind that wood suitable for destructive distillation is getting scarcer every year. For this reason a good many plants have recently been faced either with the necessity of shutting down for good and all or with the expensive operation of moving to a new site. Where some time ago it was possible for many of the Eastern plants to buy stumpage, cut the wood, season it, haul and pile it in the yards ready for use at $3 a cord or less, to accomplish this today costs in many cases as high as $7.50 a cord. Furthermore, the problem of getting the wood cut is developing into a most serious one, as the men fitted for this type of work are inclined to find employment in factories or in towns and thus escape the arduous life connected with spending the winter in the woods far from amusements and modern conveniences.

Due to the financial and political conditions abroad and to the uncertainties of future legislation in our own country, it takes a brave man to prophesy far ahead, but I can find no reason why business in this line should not continue active for at least the first part of 1924, if not for the entire year. The tax reduction bill, provided it is passed as outlined by Mr. Mellon, should help conditions materially and have a permanent beneficial effect on general business throughout the country.

On the other hand, however, should the proposed bonus bill become law, its reaction on the business of the nation would be serious and at the same time a stain on the patriotism of its promoters and the men who served their country.

Barring the passage of this bill and unforeseen conditions arising abroad, I cannot see any reason why the year 1924 should not be attended with reasonable prosperity and carry the chemical industry to an even more important place than it now holds in the business activities of our nation.

Acetate of Lime Production

Statistics on the acetate of lime industry, as given by the Bureau of the Census, have recently been revised for the census year 1921. Production and sales offer the following comparisons for the census years as mentioned:

	1921	1919	1914
Number of establishments	63	86	78
Total production, tons	30,659	84,478	83,542
For sale			
Tons	27,725	76,955	81,761
Value	$737,018	$2,682,232	$2,138,909

First Four Months Active Period in Coal-Tar Products

THE 1923 market on coal-tar products was in many respects similar to the memorable year 1920. Four months of heavy buying, 5 months of slow liquidation and 3 months of improved but rather spotty business make up the year.

Coal strike, car shortage and general belief in a rapidly expanding market led to overbuying, inflated prices and overproduction, reaching a peak during April. This was followed by a period of cancellations, price reductions, suspended operations and general inactivity. The fear of insufficient supplies gave place to the fear of insufficient outlets, and from May to September business in coal-tar products was painfully quiet. The last quarter of the year has shown a healthy improvement both in the tone and the volume of this market, with indications of still better business for 1924.

In connection with the general situation summarized above, it should be noticed that a shortage of coal always has a double effect on coal-tar products. Not only does it mean a decreased production of tar itself, but an abnormal percentage of the limited tar thus produced is used to replace in part the shortage of coal for fuel. In the exceptionally strong market of last spring, the tariff and curtailment of production in the Ruhr should be mentioned as contributing factors.

Special factors directly affecting supply and price of individual products may be noted as follows:

Creosote Oil—Resumption of railroad buying early in the year, coupled with decidedly limited supplies from England and Germany, resulted in a price advance of nearly 50 per cent, and cargo lots at Atlantic ports have sold fairly close to 18c. per gal. for the last 9 months of 1923.

Naphthalene—About one-third of the domestic production of refined naphthalene normally goes to dealers, in the form of flake and balls for moth preventive use. This business is seasonal, and manufacturers' shipments are confined largely to early spring. In 1923 peak buying of naphthalene by dyestuff manufacturers came and went coincidentally with the moth preventive season, with the result that in March and April there was a shortage of spot supplies and prices advanced for dyestuff grades from contract levels of 4¾c. to spot levels of approximately 8c. On flake and balls, spot carloads passed 10c. per lb. during the height of the season. The market reacted sharply during May and June, and the year ended at the same low levels at which it started. Importations of crude naphthalene increased from 3,144,332 lb. in 1922 to 19,108,844 lb. for the 11 months ended with Nov. 30, 1923.

Manager Chemical Department,
The White Tar Co. of N. J., Inc.,

E. J. Barber

Says: Market at peak in April; depression follows. Last quarter of the year has shown a healthy improvement in tone and volume of business. Factors that have resulted in violent fluctuations have spent their force. General tone of market is good and improved business at existing price levels is the only safe prediction.

Phenol—Since the end of the war the domestic market had been fairly stationary at 12c. per lb., the price fixed for liquidation of government stocks. The exhausting of these stocks before manufacturers were in position to resume synthetic phenol production resulted in short supply, with prices advancing above 50c. Domestic production was resumed late in the summer, and the price dropped to 25c. It has subsequently fluctuated within a 5c. range, 25-30c., with indications that it will find its level at about the former figure.

Cresylic Acid—The radical market fluctuations in crude cresylic acid were directly due to the tariff, which effectively shut out importation of the grades previously supplied from England and the Continent. Domestic production was held at about 80c. per gal. throughout the year. Imported cresylic sold as high as $1.50 during the first quarter, but with increasing importations of grades so blended as to avoid tariff specifications, prices gradually declined until during the last quarter both domestic and imported acid were selling at approximately 80c.

Benzol—This important coal-tar distillate is so largely sold for automotive fuel that its price fluctuations depend primarily on the changing prices of gasoline. It has declined steadily throughout the year, in sympathy with gasoline price declines, and the end of the year sees benzol and toluol in ample supply and readily available at the lowest prices which this market has known in many years.

As the coal-tar products market appears on Dec. 27, the factors which have resulted in violent fluctuations seem to have spent their force, and supply and demand are in fair equilibrium. Several individual products are priced so low that they would doubtless promptly reflect any temporary or sustained buying movement, but the general tone of the market is good, and improved business at existing price levels is the only safe prediction.

Byproduct and Beehive Coke Production

Average monthly production of coke, in tons, in byproduct and beehive ovens, for 6 years follows:

	Byproduct	Beehive
1923	3,125,000	1,400,000
1922	2,374,000	669,000
1921	1,646,000	462,000
1920	2,565,000	1,748,000
1919	2,095,000	1,638,000
1918	2,116,000	2,540,000

Better Times Ahead for the Fertilizer Industry

The President of the National Fertilizer Association

Gustavus Ober, Jr.

In this article expresses the hope that: "with a better prospect for the coming year than has existed since 1920, the manufacturers of fertilizer will take advantage of their opportunities and by the use of sound business methods turn the period into one of prosperity for themselves and the farmer."

THE agricultural depression which has persisted in varying degrees of intensity since the close of 1920 has naturally produced sharp reflexes in those industries directly supplying the farmers' needs. The fertilizer industry, being one of the most prominent industries in this group, has had to endure its full share of attendant troubles.

Conditions surrounding the industry in 1923, however, were better than in 1922. The truth of this can be seen in the more important characteristics of the year, particularly those affecting the farming public.

With the increase in the farmer's purchasing power and improvement in his credit position as the result of better crops this year and advanced prices for all his products, with the notable exception of wheat, the outlook for 1924 is more encouraging.

This has been reflected in the consumption of fertilizer, which shows an estimate in 1921 of 5,214,000 tons used and in 1922 of 5,925,000 tons, an increase of about 15 per cent for 1922 over 1921. The statistics for 1923 are not yet available, but it is estimated that the total tonnage will be at least 6,500,000 tons. These figures would tend to show that while the country has not yet reached a normal consumption of fertilizer, it is at least on its way toward normal, any increase in the tonnage being of material help to the industry at the present time, as it decreases the overproduction that has existed since the depression of 1920.

While many of the suggested remedies brought forth to relieve the farmer's distress were unsound and impractical, there were some measures enacted that will go far to bring about improvement in the agricultural industry. One of the most important of these is the law providing intermediate credit for the farmer, which is described by the Department of Agriculture as enabling the farmer to borrow for production and marketing purposes, for periods running from 6 months to 3 years, depending upon the purpose for which the credit is used. This act establishes the intermediate credit banks. The combined capital of the twelve banks under this act gives them a loaning power of $660,000,000.

Operation of these banks should prove of tremendous value to the fertilizer industry, since the credit facilities they extend to the country banks will enable farmers to finance their fertilizer needs by discounting their notes and paying cash for fertilizer needed. It is probably a little early to count upon benefits through operation of the intermediate credit banks, but reports indicate that country banks are availing themselves of the rediscount privilege, and it is expected that this business will steadily expand.

The National Fertilizer Association through several years of effort and close contact with the American Railway Association has established relations by which our spring and autumn movements of fertilizer are satisfactorily protected. The outbound shipments in the spring and in the autumn come at periods when general traffic offered the carriers is at its peak. Notwithstanding the widespread competition for equipment during these two periods of heavy loading, we have been quite fortunate in receiving favorable consideration for our needs. In common with other basic industries, it has been felt that freight rates on fertilizer were too high and adjustments should be made all along the line. Various conferences have been held with executives of the carriers and it is hoped out of these will come substantial relief.

The National Fertilizer Association has been active within its own sphere of service during the past year. A campaign recommending the use of high analyses and the reduction of the number of analyses now being offered has been carried on with much enthusiasm. This campaign has included meetings with the state educational institutions and many salesmen's conferences, so that the whole matter would be thoroughly understood by all concerned. The work done in this, which tends toward the simplification and standardization of brands, has been so thoroughly approved by the Department of Commerce, which has been interested in the elimination of "useless varieties," that it has requested a statement from us in regard to it. The investigations and conferences showed that in some states as high as 125 different analyses were used, whereas fifteen or twenty were all that were needed to take care of the different soil types and crops. I think the value of united effort in accomplishing industrial progress is illustrated anew in these conferences of state officials and fertilizer executives.

While the true worth and real value of these changed conditions have not been fully reflected within the industry itself, it is hoped that with a better prospect for the coming year than has existed since 1920 the manufacturers of fertilizer will take advantage of their opportunities and by the use of sound business methods turn the period into one of prosperity for themselves and the farmer. The fertilizer industry has undoubtedly suffered tremendously in the past 3 years. It is, however, a basic industry and is fundamentally sound, and it is hoped that it will emerge into the position that it formerly occupied and should again attain.

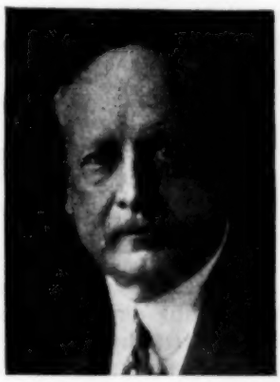
Bichromates Move in Good Volume Throughout Past Year

The President of
The Mutual Chemical Co. of America

Fred W. White

Says: "Buying of bichromates in 1923 was of fair volume. Overproduction was stimulated by advances in prices in May and June, following large orders for export. This extra supply of one manufacturer did not find a market and values in November and December were below original contract levels."

THE volume of sales for bichromate of soda reached fairly large proportions in 1923. Manufacturing trades that have come to be recognized as regular users of bichromate were again the principal buyers. There were some variations in the customary allotments to the various consuming industries, influenced by the relative activity in the respective lines. The tanning trade may be mentioned among those that took a little less bichromate during the year than they are accustomed to purchase. On the other hand, the usual quotas were exceeded by color makers and by textile manufacturers. A good part of the bichromate delivered in 1923 was sold on a contract basis. Contracts for 1923 were made in the fall of 1922 at prices ranging from 7⅞c. to 7¾c. per lb. In the months of May and June of the past year an extra demand for bichromate of soda came on the market in the form of relatively heavy buying for export. This had a strengthening effect on quotations and prices advanced to 8½c. per lb. This stimulated an extra production from a manufacturer who previously had been closed down. When he was unable to market his output, the market again receded and in November and December had declined to a level a little below that at which the original contracts had been taken.



Bichromate of Potash—The contracts originally placed for 1923 deliveries of bichromate of potash were on a basis of 9¾@10c. per lb. There was very little variation in the contract price throughout the year and the market was about stationary during the 12 months. New uses are being found for bichromates in the metallurgical industry as well as enlarged uses for it in the manufacture of chrome soles.

Rhodesian and Indian Chromite Led in 1923 Imports

IN A report on chrome ore, Edward Sampson of the U. S. Geological Survey states that the chemical industry uses a large amount of chromite, mainly in the manufacture of chromates and bichromates of soda and potash, which find many uses, both direct and in the manufacture of other chemicals. Chromium chemicals are used mainly in tanning, in dyeing cloth and for pigments.

In 1918 an estimate of the amount of chromite required by various industries was made by the War Industries Board. Recently one of the largest importers estimated what he considered the requirements of the industries in 1922. The following are his figures as compared with the 1918 estimate. The 1918 estimate was on the basis of a consumption of 130,000 tons and the 1922 estimate is on the basis of a consumption of about 110,000 tons.

In 1923 market prices for chrome ore fluctuated within narrow limits. Prices ranged from $18.50 per ton for the Indian and Turkish ore to $23 per ton for New Caledonian and Rhodesian ore. The largest part of importations came from Rhodesia and India, and New Caledonian shipments were light, because of restricted output there of high-grade ore.

Estimated Consumption of Chromite, in Per Cent of Total

	1918	1922
Ferrochrome	52	40
Refractories	17	35
Chemicals	31	25

The demand for chromite throughout the year is constant, as is also the supply. In general, it appears that the consumption of chromite in this country will increase under the present tariff conditions, owing to the partial substitution of chromite for magnesite refractories, magnesite being dutiable and chromite being on the free list.

Under the chemical qualifications of chromite must be considered not only the chromium content but also the amount of various impurities and their relation to one another. In the mineral chromite, iron, magnesium and aluminum may be present as chemical impurities. In the associated minerals the main impurities are magnesia and silica. For use in making chromium chemicals the chromium content is the main factor, the nature of the impurities being of less importance than their aggregate amount.

In securing information on the prices of chromite over a period of years it has been found best to reduce the results to a unit basis. So far as possible the unit prices represent 50 per cent ore. The following table shows the unit prices for 1908-1922. These figures are approximations only, the data on which some of them are based being meager:

Average Prices of Chromite in Cents Per Long Ton Unit of Cr_2O_3

1909	33	1914	28	1919	95
1910	30	1915	45	1920	78
1911	29	1916	80	1921	55
1912	29	1917	100	1922	45
1913	31	1918	140		

A Satisfactory Year for the Lime Industry

General Manager,
American Lime & Stone Co.

William R. Phillips

Looks toward the future with optimism and believes that the marked technological progress and the stabilizing effect of the National Lime Association will mean remarkable advances in the industry.

THE lime industry during the year 1923 has experienced, on the whole, a satisfactory year. The demand for lime in agricultural, construction and chemical fields, while not equal to the demands of the war period, have shown a healthy increase such as might be expected in a growing industry. Supply and demand have been fairly well balanced and prices have been about the same as in 1922. Competition has been from keen to sharp, particularly at certain periods in the year where seasonal influences are felt.

Competition on quality has become exceedingly keen, and is rapidly raising the entire lime industry to the plane of a highly developed chemical manufacturing business, a development that will more and more act to the benefit of lime users and undoubtedly, in the long run, to the benefit of the lime industry itself.

Higher Standards of Quality Demanded and Offered—Due to co-operation between leading lime manufacturers and leading consumers, new and higher standards of quality are rapidly being established. The physical and chemical properties necessary for different uses are being studied by both manufacturer and purchaser; the general terms "good lime" and "bad lime" are rapidly being recognized by consumers as insignificant or inadequate, and are being replaced by the technical terms describing the properties of the product best suited for each specific purpose.

Lime manufacturers are more and more placing their plants under the control of technically trained men for the purpose of manufacturing their product in such a way as to supply the physical and chemical properties best suited for the trade they aim to supply.

Noticeable Influx of Technical Men—The gradual influx of technically trained men to the lime industry, which has been slightly noticeable for the past few years, in 1923 reached a point where the demand for the services of such men is scarcely equal to the supply. The future is certain to feel the effects of the works of these men, to the benefit of both manufacturer and consumer.

Improved Manufacturing Facilities—There has been a strong tendency on the part of lime manufacturers to improve their manufacturing facilities during the last year. The abandonment of old-fashioned kilns and methods in favor of new equipment and practices is progressing at such a rate that it is a matter of only a short time until the typical lime plant of 5 years ago must have gone with the past; its successor, the modern, efficient, laboratory-controlled lime-manufacturing plant will have taken its place. The progress in this direction during 1923 has been greater than in any similar period in the history of the industry and 1924 promises to set a new high mark in this direction.

Improved packing and shipping methods, particularly for chemical lime, such as air-tight steel drums and air-tight steel barrels, have become more in demand during 1923 to assure the retention of the purity and strength of the materials when they reach the consumer.

The demand for improved barrels for the building trade reached such a point in 1923 as to cause a large number of manufacturers to discard the common slack barrel so long in use for a higher grade tongue and grooved barrel to better protect the contents.

United Efforts for Research Work—There are several outstanding developments of 1923 that may reasonably be expected to exert a strong and lasting influence on the lime industry. Foremost among these is the stabilization of the National Lime Association for the purpose of continuing technical studies for the improvement of all lime products and their market.

This development is placed first in line because a careful analysis of other important developments in the industry brings out the fact that they all lead back to association work and are either the direct accomplishments of this body or the indirect results coming from its work.

The permanence of this organization was assured during 1923 by the establishment of its financial support on a liberal basis for a period of 3 years, and this step places it in a position where it can devote its entire energy toward the technical problems of the industry, without having to face the dangers of dissolution each year, a danger always present in the past, especially if the industry encounters a poor year's business.

Directly attributable to this broad-gage policy of the leading lime manufacturers, we already have a number of concrete results that justify the policy they have adopted.

The Future—The lime industry looks toward the future with great confidence, feeling that the progress it is making within itself will cause it to share the bright future that seems to be certain for the entire country and particularly the agricultural, building and chemical industries of the country. It feels that the coming year should be the best in its history, at least in so far as the broad principles of its advancement are concerned, and in volume of output the indications are for a healthy increase over the year just passed, with a possibility of demand closely approaching the possible maximum supply.

Industrial Alcohol Made Progress in 1923

Director of Sales Development, U. S. Industrial Alcohol Co.

Burnell R. Tunison

Declares in this article that: "the progress of the alcohol industry during 1923 has done much toward placing the chemical and allied industries on a firm foundation."

TO REVIEW the events and progress of an industry over any given period of time seems a comparatively simple matter, but to determine whether or not any progress has been made by an industry subject to the many and varied influences which affect the manufacture and use of alcohol is oftentimes a difficult matter. It is so easy to take statistics and because of some temporary increased consumption arrive at the erroneous conclusion that real progress has been made. The opinion is very general that the alcohol industry during the past year has experienced marked and satisfactory development. There are many facts that justify this conclusion, and a few that make it somewhat questionable.

Consideration must be given to a large number of varied industries if we are to obtain a true picture of the industrial development of alcohol, the chemical raw material. This being manifestly impossible, we can at least obtain an indication of the trend by comparing the figures for the consumption of alcohol during the year with previous years. The most accurate data available are provided by the U. S. Bureau of Internal Revenue, which controls the production, sale, distribution and use of alcohol. These figures cover fiscal years ending June 30 and for that reason comparisons are made on that basis. The curves and statistics presented here cover only denatured alcohol and do not include the pure alcohol used for scientific and industrial purposes.

A comparison of the number of the manufacturing and denaturing plants and the amount of alcohol they produced, as well as the number of bonded manufacturers using specially denatured alcohol, is interesting.

Table I—Manufacture and Denaturing Plants for Industrial Alcohol

	No. of Alcohol Plants Other Than Fruit	Denaturing Plants	Alcohol Produced Proof Gal. Other Than Fruit	Gal. Tax-Paid Alcohol Withdrawn	No. of Permits for S.D.	No. of Permits Tax-Free Alcoho
1913	420	21	185,353,383	140,289,425	.....	.....
1921	70	67	86,365,658	34,993,155	1,761	3,078
1922	76	77	79,906,101	16,363,302	3,287	3,297
1923	68	76	122,402,850	10,743,380	5,445	3,981

During the year the tendency for manufacturers to use denatured alcohol instead of pure tax-paid spirits has been apparent. This is shown by the positive reduction in the number of gallons of tax-paid alcohol withdrawn and also by the increase in the number of permit holders, as well as the greater volume of denatured alcohol used. The number of formulas authorized for denatured alcohol has kept pace with the demand. Up to 1913 there were two completely denatured and twenty specially denatured alcohol formulas, while today there are seven completely denatured, and the specially denatured formulas with their modifications make possible several hundred different combinations. One of the major developments of the year 1923 is the increase in the consumption of denatured alcohol (C. D. Nos. 5 and 6) for use as an

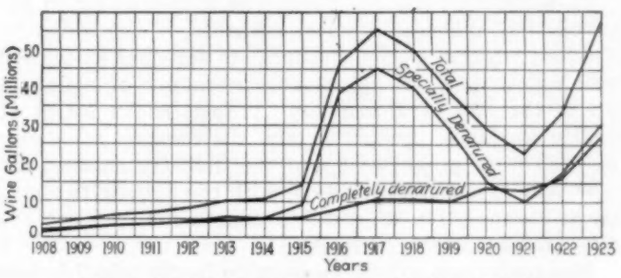


Fig. 1—Production of Denatured Alcohol, 1908-23

anti-freeze for internal combustion cooling systems. It has been proved repeatedly that denatured alcohol is the most satisfactory anti-freeze, and it is gradually replacing other compositions for this purpose.

Tables II and III indicate the distribution of alcohol among the completely denatured formulas and among those specially denatured formulas where the consumption in any year under comparison exceeded half a million gallons. These figures are taken from the annual reports of the Commissioner of Internal Revenue.

Table II—Distribution of Completely Denatured Alcohol by Formulas

Formula No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	Total
1913 4,961,105	261,136	.....	.....	.....	.....	5,222,241
1921 50,420	251,201	50,043	268,315	6,496,719	5,109,820	12,226,519
1922 166,216	300,192	117,371	22,596	9,843,651	5,759,877	16,209,903
1923 455,833	541,418	270,431	34,201	18,809,225	6,912,309	27,013,418

During the past year there has been a gratifying development and expansion of the manufacture of solvents involving the use of alcohol. The increased consumption of such formulas as Nos. 1, 2b and 3a denotes a general industrial chemical progress that gives promise of continuing. There has been a marked increase in the consumption of specially denatured formulas

(Continued on page 96)

Table III—Distribution of Specially Denatured Alcohol By More Important Formulas

	Formula No. 1.	No. 2b	No. 3a	No. 4	No. 13a	No. 18	No. 23a	No. 39a	No. 39b	No. 40
1913	2,839,021	.....	59,165	511,330	471,111	166,890	.....	.....	.....	.....
1921	3,393,826	1,990,326	229,909	679,548	996,048	725,817	137,518	50,058	.....	26,357
1922	4,994,241	2,450,939	540,771	898,948	1,780,771	1,036,893	466,832	1,330,091	1,425,543	321,975
1923	7,195,023	4,746,095	681,775	737,932	2,268,017	843,663	507,288	2,339,435	6,534,006	948,035

Establishment of Flat Quotations and Lowering of Prices Features in Alkalis

Director of Sales
Michigan Alkali Co.

E. M. Taylor

gives an interesting and comprehensive review of the alkali markets for the past year. His résumé is a story of progress and foretells favorable conditions for 1924.

"The past year will be memorable in the alkali industry, because it inaugurated a new and distinctly American method of quoting soda ash and caustic soda. In June the change from former methods of doing business was made complete by the adoption of flat quotations for the various strengths and grades of ash and caustic. This method of quoting is more rational and makes for clearer understanding between buyer and seller."

GENERAL industrial operations in this country throughout 1923 were irregular, with intermittent periods of activity and quietness. Naturally this condition found its counterpart in the respective lines of industry, and production of alkalis may be described as in close conformity with the trend of national business. The first quarter was the boom period of the year. Producers entered the year with a large part of their output sold ahead on contract. Call for withdrawals was prompt and insistent and new orders appeared in volume large enough to test the capacities of some plants.

In the spring months there was a slackening in the production and consumption branches of the industry. The hot weather period brought its seasonal let-up and was followed by an appreciable widening of activities up to the end of December. Translated in terms of yearly averages, production and distribution of alkalis in 1923 were progressive and the industry entered the new year in a sound condition, with the outlook favoring large consumption of alkali products for at least the first quarter of the new year.

The past year will be memorable in the alkali industry, because it inaugurated a new and distinctly American method of quoting soda ash and caustic soda. From the founding of the domestic trade the New York and Liverpool test had been used as the basis for trading. This was an outgrowth of our trade with England and the custom had been extended to regulate transactions in the purely domestic field. The New York and Liverpool test was devised in order to offer a method of computing the composition of caustic soda and soda ash by chemical analysis and based on chemical equivalents. While this test was inaccurate in expressing the purity and quality of alkalis, it nevertheless established a standard and was the arbiter of trading for many years. More recently the domestic trade, while clinging to the New York and Liverpool test as a vehicle for quotations, has sold these products on test of actual alkali content. In June the change from former methods of doing business was made complete by the adoption of flat quotations for the various strengths and grades of ash and caustic. This method of quoting is more rational and makes for clearer understanding between buyer and seller.

It is a tribute to the sound marketing principle that underlies the distribution of alkalis that sudden and unexpected changes in consumptive requirements are readily met by adjustments in plant operations. The attitude of producers in stabilizing selling prices in accordance with production costs was evidenced by the announcement of lower price schedules in the latter part of the year. The revised quotations included deliveries over 1924 and thus gave consuming industries the assurance of securing alkalis on more favorable terms in the coming year. The lowering in prices was not brought about by any drastic change in producing costs, but rather represented the intention of manufacturers to encourage large consumption in home and foreign markets, thus leading to quantity production and relatively low unit costs.

Industrial Alcohol Made Progress in 1923

(*Continued from page* 95)

Nos. 39, 39b and 40. This has been due to the use of these denatured formulas in the manufacture of perfumes, cosmetics, liniments, barbers' supplies and toilet preparations of various sorts and in a great many cases where tax-paid alcohol had formerly been used. The consumption of tax-paid alcohol has steadily decreased and the use of tax-free alcohol has resulted in lower prices and stimulated development so that the increase in the use of denatured alcohol has exceeded the decrease in the use of tax-paid alcohol.

The progress in the alcohol industry during 1923 has done much toward placing our chemical and allied industries on a firm foundation. In the past progress has been restricted by government interference and taxes. In the future the control of the progress of those industries dependent upon alcohol lies, in a measure, in the hands of the Treasury Department. Users of alcohol should see that the newly created Alcohol Trades Advisory Committee is informed as to their needs, and it is hoped that Treasury Department officials will seek and act upon the advice of this committee in order that the alcohol and alcohol-using industries may be developed according to the law, which provides:

". . . . . and to place the non-beverage alcohol industry and other industries using such alcohol as a chemical raw material or for other lawful purpose upon the highest possible plane of scientific and commercial efficiency consistent with the interests of the government, and which shall insure an ample supply of such alcohol and promote its use in scientific research and the development of fuels, dyes and other lawful products."

Export Trade Enters New Era of Progress

The encouraging recovery evidenced in 1922 proved fundamentally sound and in 1923 the chemical and allied industries have built up an export trade on an even more substantial basis.

By C. C. Concannon

Chief, Chemical Division,
Bureau of Foreign and Domestic Commerce, Department of Commerce.

BOTH the export and the import chemical trade of the United States during the past year were in an essentially healthy condition quite in keeping with the domestic chemical industry as a whole. The year has been one of real progress from the standpoint of all phases involved and the industry has kept pace with the growth within our entire commercial and manufacturing activities. Compared with other countries, the balance between exports and imports, together with the considerations of production, distribution and consumption within the domestic field, places us, on the whole, in a most favorable situation.

The fact that the importations of chemicals and allied products exceeded the exportations by nearly one-third is not adverse comment. Rather it is another indication of the development of the chemical industry, for the larger importations were chiefly of crude materials necessary in the manufacture of other finished products. For example, more than $57,000,000 worth of fertilizers ($38,000,000 of sodium nitrate), $41,000,000 of gums, resins and balsams, $12,700,000 of china wood oil, $9,300,000 of dead or creosote oil, $8,000,000 of crude drugs, $5,000,000 of essential oils and $4,230,000 of casein all helped to raise the total importations.[1] This growth in imports is in keeping with the increase in each of the crude commodity groups and is due to the increasing requirements of our manufacturing industries for natural and other raw materials and partly manufactured products growing out of our increasing industrial activity. These imports are largely non-competitive in character.

The steady progress made in the export trade of chemicals and allied products during the year 1923 was most encouraging. Although at this writing the figures for the entire year are not available, the gain of 20 per cent made during the 11 months of 1923 would indicate that the year so far as exports were concerned was exceptionally favorable. The possibilities open to American exporters of chemical products are clearly shown by the grand total of more than $135,700,000 worth of chemicals and allied products which were exported during this period.

Coal-Tar Products—Of the commodity groups embraced by the term "chemicals and allied products," the greatest percentage of increase in exports occurred in coal-tar products, when an advance of 60 per cent for the 11 months of 1923 was made as compared with the corresponding period of 1922. This group has shown an irregular increase throughout the year due to ever-changing conditions abroad. The occupation of the Rhineland presented an opportunity in many foreign markets which American manufacturers were quick to take advantage of and although circumstances have been propitious, intensive merchandising methods will be necessary if our present position in this field is maintained. It may be temporary or it may be permanent, depending upon the will of American manufacturers and exporters of coal-tar products. The group of coal-tar products registered an advance of 60 per cent for the period under review, significant even though this class represents but approximately 10 per cent of our total chemical exports. Nearly $5,000,000 worth of crudes and $6,000,000 worth of coal-tar products were shipped abroad. Although the total exports of coal-tar products fell below the total imports by $5,000,000, this big difference may be attributed in part to the $10,500,000 worth of crudes received, particularly to the $9,350,000 worth of dead or creosote oil. On the other hand, the exports of finished coal-tar products were in excess of the imports.

Paints and Pigments—The next largest increase was made in exports of pigments, paints and varnishes, which showed a gain of 50 per cent over 1922, and which equaled 11 per cent of the total exports. Foreign sales of these products have been on the upswing for the past 2 years. The demand for carbon and lampblack has more than doubled and accounted for about one-quarter of the total of this group, which amounted to over $15,000,000. Paints, stains and enamels, approaching one-third of the total, and varnishes, one-fifth, both jumped one-third in values shipped. The imports, on the other hand, dropped 13 per cent and were but one-fifth of the exports. Nearly one-half of the total imports comprised mineral earth pigments; one-sixth were paints, stains and enamels. In connection with paints and varnishes, it is interesting to consider the ambitious program mapped out for accomplishment by the industry and to note the degree of success that has attended their efforts in the domestic field. The steady increase in foreign sales during the past 2 years and the big relative increase in percentage for the period under review augurs well for the success that should attend a determined effort on the part of our paint and varnish manufacturers to enter foreign markets in a comprehensive way.

Naval Stores—Naval stores, which formed about one-fifth of the grand total of chemical exports and in the production of which the United States is the principal factor in the world's trade, increased 40 per cent. Over a million barrels of rosin, valued at $10,150,000, and 11,000,000 gal. of spirits of turpentine, valued at $12,000,000, were placed in foreign markets in 1923. The United Kingdom offered the best market, receiving 23 per cent of the former and 53 per cent of the latter.

[1] Eleven months comparisons only are employed. Twelve months figures not available at this date, Jan. 11, 1924.

Other countries which took important quantities were Germany, Netherlands, Canada, Brazil, Argentina, Japan and the Dutch East Indies. A movement toward better organization within the industry at home and the formation of associated effort in developing export trade within this field should result in progress.

Fertilizers—The foreign demand for American fertilizers and fertilizer materials, which gained 26 per cent over 1922, represented 14 per cent of the grand total. More than one-half of the exports of fertilizers was made up of sulphate of ammonia, which had a strong demand from Japan, accounting for more than three-fifths of the total. Cuba afforded another market. Although there was a slight loss in the values of the foreign shipments of phosphate rock, there was an advance of 20 per cent in the quantities. Imports of fertilizers, on the other hand, which equaled 30 per cent of the total importations of chemicals and allied products, rose 38 per cent in value. An advance of more than 50 per cent was made in the receipts of sodium nitrate in the 11 months of 1923 as compared with the 11 months of 1922. More than $3,000,000 of calcium cyanamide and $3,600,000 of muriate of potash entered the United States in 1923.

Toilet Articles—The foreign demand for American perfumery, cosmetics and other toilet preparations increased 10 per cent in the 11 months of 1923 over 1922. In all probability the figures for the entire year will approach if not equal the $7,300,000 worth exported in 1919, but will still be below the peak figure of 1920. This gain is also another indication of the part the United States is playing in recovering world trade held during the war. American products are now found in practically all foreign countries. Over $2,000,000 worth of dentifrices, $1,500,000 worth of talcum and other toilet powders, $1,000,000 worth of creams, rouges and cosmetics and $500,000 of perfumery were exported during the 11 months of 1923.

In contrast to this increase in exports, a 44 per cent loss was registered during the 11 months of 1923 as compared with the 11 months of 1922 in the imports, which were below the exports ($1,000,000 less, or one-sixth of the total). Of the total imports of this class, more than $2,000,000 was composed of perfumery, including cologne, and $2,200,000 of perfume materials.

Industrial Chemicals—Due to the fact that only a comparatively few items are shown in official statistical compilations for industrial chemical exports (seventeen, exclusive of sodas) and that one-quarter of the total value is made up of the class "other chemicals except medical and pharmaceutical preparations" and that nearly one-third comprises "sodas and sodium compounds," it will be readily seen that it is difficult to review properly this important class of chemicals. The total general chemical class exclusive of coal-tar products, medicinal and pharmaceutical preparations, fertilizers, pigments, paints and varnishes, etc., although having shown a loss of 4 per cent in value, recorded a gain of 5 per cent in quantity, and the class "other chemicals" showed a loss of 5 per cent in value and a gain of 2 per cent in quantity.

Acids and anhydrides dropped 14 per cent in quantity and 29 per cent in value. Of the individual items included under this general class for which figures are given, acetic acid showed 75 per cent, sulphuric acid 15 per cent, and boric acid 45 per cent losses in values. Although the shipments of wood and denatured alcohol advanced 43 per cent in value, the quantity fell slightly (3 per cent). The exports of formaldehyde, which were comparatively small during the first half of 1923, have been rather large during the latter part, especially during the months of September, October and November, having made the total for the 11 months show an expansion of 36 per cent in quantity and 70 per cent in value over the 11 months of 1922. Aluminum sulphate advanced 35 per cent in value and 40 per cent in quantity. Acetate of lime fell 19 per cent in quantity, but rose 44 per cent in value. Exports of calcium carbide and bleaching powder, however, both dropped in quantities and values and the percentages in values were 40 per cent and 22 per cent respectively. Other industrial chemicals having shown losses in value were copper sulphate 47 per cent, glycerine 20 per cent, chlorate of potash 56 per cent, bichromate of potash 35 per cent, and ammonia and ammonium compounds (exclusive of sulphate of ammonia) 5 per cent.

The exports of sodas and sodium compounds advanced 16 per cent in quantity, but fell 4 per cent in values. Shipments of caustic soda in 1923 were 23 per cent less in quantity and 30 per cent less in value than in 1922, while the demand for borax more than doubled in both instances. The occupation of the Rhineland has had its influence in the exportation of commodities within this group. That same condition is an important factor in our increase in coal-tar products and should be of value here in building up our exports of industrial chemicals. This together with the increased organization and efficiency of the domestic industry as a whole should result in an increase in foreign trade provided our American manufacturers and shippers intend to compete seriously for their share in the world's markets.

The schedule of the imports of industrial chemicals shows a larger number of individual items than the export schedule, but comparisons cannot be made since the figures for many of the commodities covered are for the period Sept. 22 to Nov. 30, in 1922, and for the 11 months January to Nov. 30, in 1923. Figures for values only are available. It is impossible therefore to give a detailed comparison by classes. Taking the total values of the imports, they showed an actual loss of 3 per cent in 11 months of 1923, but at that are in excess of the exports by approximately the same percentage as in 1922 (9 per cent), or $2,500,000.

A year ago we were slowly recovering from a depression that encompassed our entire industry, yet "chemicals and allied products" was one of the few groups to show an increase in exports for the year 1922, and this was in the face of a decided drop in the entire export trade of the country. The recovery evidenced in 1922 proved itself to be fundamentally sound and secure, with the result that the United States chemical export trade for 1923 was in a still more favorable condition. Although imports had increased, this was not a disquieting influence, for the domestic industry as a whole was in a very excellent condition and developed a consuming capacity to absorb these foreign stocks. The important thing in formulating any judgment as to the economic future of the industry is an understanding of our present position and of the forces that are in motion for and against progress. That the chemical industry has entered upon an era of accomplishment and of success is an anticipation predicated upon past experience and present progress.

The Flexible Tariff and the Chemical Industries

A review of the status of chemical investigations reveals compilation and study of production costs and other valuable industrial data bearing on the competitive situation.

By C. R. DeLong
Chief, Chemical Division,
United States Tariff Commission.

DURING the year 1923 the larger part of the work of the Chemical Division of the United States Tariff Commission has been in connection with applications for changes in rates of duty under section 315, one of the so-called flexible sections of the tariff act of 1922, and with investigations of costs of production for the purposes of this section.

Since the passage of the tariff act of Sept. 21, 1922, applications have been received for changes in the duty on thirty-four chemical commodities, and upon twelve of these investigations have been ordered. The chemicals under investigation, with the rate of duty under the act of 1922, and the change requested, are shown in Table I.

An analysis of the applications on chemicals according to the interest of each applicant is shown in the tabulation below. Of the thirty-four applications, twelve were from domestic manufacturers for increases in the rate of duty on products made by them. The remaining twenty-two applications were for decreases; of these, twelve were from domestic producers who were consumers of the product, eight were from importers, one was from a foreign manufacturer, and one from an ultimate consumer.

Table I—Chemical Investigations Under the Flexible Tariff

	Commodity	Rate of Duty Act of 1922	Requested Change in Duty
1	Barbital	25% ad valorem	*Increase
2	Barium peroxide	4c. per lb.	Increase
			Decrease
3	Casein	2½c. per lb.	Decrease
4	Cresylic acid	7c. per lb. plus 55% ad valorem	Decrease
5	Linseed oil	3.3c. per lb.	Decrease
6	Logwood extract	15% ad valorem	*Increase
7	Oxalic acid	4c. per lb.	Increase
			Decrease
8	Phenol	7c. per lb. plus 55% ad valorem	Decrease
9	Potassium chlorate	1½c. per lb.	Decrease
			Increase
10	Rare sugars and amino acids	50% ad valorem	*Increase
		25% ad valorem	*Increase
11	Sodium nitrite	3c. per lb.	Increase
12	Synthetic phenol resins	7c. per lb. plus 55% ad valorem	Decrease

* Request that basis of assessment of ad valorem duty be changed from foreign market value to American selling price.

Status of Chemical Investigations

Barium Peroxide—There are two domestic producers, the J. H. R. Products Co. of Willoughby, Ohio, manufacturing for sale, and the Oakland Chemical Co., of New York, using its output in making hydrogen peroxide. The J. H. R. Products Co. applied for an increase in the duty, while John Bene & Sons, consumers of barium peroxide in making hydrogen peroxide, requested that the duty be decreased.

The commission in its investigation obtained costs of production from the two domestic makers and from one manufacturer each in England, France and Germany, and an estimate of costs from a second company in Germany. A tentative comparison of domestic and foreign costs submitted to interested parties prior to the public hearing tends to show that the costs in England and France, when shipping charges and the present duty are added, differ only slightly from those in the United States, and indicates that costs in Germany are considerably lower than in the United States.

A public hearing was held in the office of the commission on Nov. 9, 1923. Final argument in the case was waived and briefs were filed on Nov. 20. The commission has the case under consideration before making its report to the President.

Casein—Applications were made for a reduction in the duty on casein by domestic consumers—coated paper manufacturers and a plywood veneer manufacturer. Costs of production were obtained from eighteen domestic producers, the output of these companies constituting 72 per cent of the domestic production, and from five companies making about 65 per cent of the casein produced in Argentina. A public hearing was held on Aug. 13 and 14 at the office of the commission in Washington. On Sept. 25 briefs were filed and opportunity for final argument was given. After a consideration of matters developed during the public hearings, the commission concluded that additional data are desirable for a determination of differences between costs of production in the United States and Argentina.

Sodium Nitrite—The American Nitrogen Products Co., of Seattle, Wash., the only domestic producer using the arc process, applied for an increase in the duty on sodium nitrite. Costs of production were obtained from the three domestic producers, each of which uses a different process—namely, (1) the arc process, (2) ammonia-oxidation process, and (3) the sodium nitrate, lead-reduction process.

The largest foreign producers of sodium nitrite are in Norway and Germany. Manufacturers in these countries declined to give the commission's investigators access to their cost records. In Norway, information was obtained from other sources as to power costs, prices of soda ash, wage rates and other facts relating to production costs.

Production in Norway is by the arc process. The immense hydro-electric developments in that country afford cheap electric power, this being one of the important elements in the cost of producing sodium nitrite by this process. In Norway, the principal production of the atmospheric fixation of nitrogen is calcium nitrate, a fertilizer material, while sodium nitrite is more or less a by- or end-product. In the United States, on the other hand, sodium nitrite is the only product made by the arc process and by the ammonia-oxidation process.

A public hearing on sodium nitrite was held on Sept. 10 at the office of the commission in Washington.

A summary of information on sodium nitrite was subsequently submitted to interested parties, and on Oct. 6 a final hearing was held at which opportunity was given for argument and the presentation of briefs.

On Dec. 15, as a result of a petition for a writ of mandamus on behalf of the Norwegian Nitrogen Products Co., the American representative of the Norsk Hydro, the manufacturer of sodium nitrite in Norway, the Supreme Court of the District of Columbia issued an order to the commission to show cause why the cost and other records of the American Nitrogen Products Co. should not be disclosed to the Norwegian Nitrogen Products Co., and why an opportunity should not be given to examine and cross-examine investigators of the commission who collected data as to cost of producing sodium nitrite. The decision in this case may have an important bearing on investigations under section 315.

Oxalic Acid—This chemical is produced by only two companies in the United States and costs of production were submitted by them. They use the caustic soda-carbon monoxide process, the sawdust-potash method having been practically discontinued in favor of this process. The Victor Chemical Works of Chicago applied for an increase in the duty, and R. W. Greeff & Co., representing the only producer in the Netherlands, applied for a decrease.

The manufacturers in Germany declined to reveal their production costs, but costs of the single Dutch company were obtained. A tentative comparison of domestic and foreign costs of production, submitted by the commission to interested parties in the course of the investigation, tends to show that the costs in the Netherlands are substantially lower than the domestic, but that when the present duty is added to this foreign cost, the difference is practically eliminated.

A public hearing held in the office of the commission in Washington on Nov. 5 closed without final argument or the filing of briefs. The commission is considering the data prior to reporting to the President.

Potassium Chlorate—The Diamond Match Co., of New York City, applied for a decrease in the rate of duty, while two domestic manufacturers—the National Electrolytic Co., of Niagara Falls, N. Y., and the North American Chemical Co., Bay City, Mich.—applied for an increase. Costs of production were obtained from the two domestic manufacturers, but were withheld by producers in Scandinavia, Germany and France, and opportunity to verify Swedish cost data by reference to books of record was not given. General information on raw material costs and power consumed was obtained in France and Germany. The information secured, as summarized by the commission for general use at the public hearing, tends to show that costs of production in Europe are considerably lower than such costs in the United States.

Table II—Comparison of the Cost of Producing Logwood Extract in the United States and in the West Indies

	Weighted Average Costs	
	United States	West Indies
	Cents Per Pound	
Material	4.548	2.336
Containers	.330	.573
Labor	.724	.329
Factory expense	1.003	1.214
General expense	1.277	1.485
Total cost	7.882	5.937
Average charge for freight and other expenses from West Indies to New York	.....	1.000
Total cost in New York, including duty	7.882	6.937
Duty of 15 per cent on 5.27c. per lb., based on United States value of 7.5c.	.....	.791
Total cost, including duty	7.882	7.728

A public hearing was held in Washington on Nov. 14, and although dates were set for the filing of briefs, none was filed. The commission has the subject under consideration prior to reporting to the President.

Barbital or Veronal—The Abbott Laboratories of Chicago applied for an increase in the duty. Costs of production were submitted by the two domestic manufacturers and by the largest manufacturer in Switzerland. The latter, however, refused permission to check his statement to books of record. A statement of manufacturers' prices in Germany was obtained. A tentative comparison of domestic and foreign costs submitted by the commission to interested parties prior to the public hearing tends to show that foreign costs are lower than domestic.

A public hearing was held at the office of the commission in Washington on Nov. 7. It was closed without argument or the filing of briefs. The case is under consideration by the commission before reporting to the President.

Synthetic Phenolic Resins—Domestic costs of resins from which cigarette holders, pipe stems and other smokers' articles are made have been obtained from manufacturers. The only producing concern in Germany withheld cost data.

Logwood Extract—The American Dyewood Co., of New York City, applied for an increase in the rate of duty on logwood extract. Costs of production were obtained from seven domestic companies and from the records of the three largest firms in the West Indies. Table II shows a tentative comparison of these costs.

A public hearing, held at the office of the commission in Washington Nov. 12, was closed without argument or the filing of briefs. The data submitted are being studied by the commission before reporting to the President.

Linseed Oil—Applications for a reduction in duty on linseed oil were made by domestic manufacturers of paints and varnishes and such floor coverings as linoleum. Costs of production have been obtained from domestic crushers, from five companies in England the output of which represents about 75 per cent of the British production, and from producers in the Netherlands representing about 50 per cent of the Dutch output. These costs are being tabulated and compared. A public hearing has been set for Feb. 5, 1924, at 10 a.m. in the offices of the commission in Washington. A statement of the information compiled by the commission will be submitted to interested parties prior to this hearing.

Phenol and Cresylic Acid—Applications were made by the Insecticide and Disinfectant Manufacturers' Association and by manufacturing pharmacists for a decrease in the duty on cresylic acid and by James F. Ballard & Company of St. Louis, Missouri, for a reduction of duty on phenol. Costs of production of these related products, obtained from domestic producers and from the principal manufacturers in England, are being compared. A summary of the information gathered will be submitted to the interested parties prior to the public hearing set for Jan. 24, 1924, at 10 a.m. in the offices of the commission in Washington.

Larger Output of Chemical Products

Allied Materials Account for Greater Part of Increase in Domestic Production in 1923

UNDER the influence of heavy demands from consuming industries, production of chemicals had been expanded in the closing months of 1922 and this condition held true for the first half of 1923. In the meantime the outlet for many products into the manufacture of which chemicals enter had been checked and it became evident that there was an oversupply not only of chemicals but of manufactured products as well. As a result, there was a marked slowing up in chemical manufacture throughout the summer months. More active trading in the last quarter of the year again stimulated production. Official figures covering the year's output of chemicals will not be available for a long time, but private estimates, based on the movement into consumption of important basic chemicals and with due allowance for the increase in export trade, place total production of chemicals and allied products at close to 10 per cent in excess of that for 1922.

The latest figures for production of chemicals are found in the statistics compiled by the Bureau of the Census for 1921. Earlier estimates of the census for that year have been revised and Tables I and II offer comparisons for the census years as designated.

An analysis of market prices shows that the majority of chemicals were lower at the close of the year than they were on Jan. 1. The weighted index number also was lower at the close of the year than at the beginning, although the difference was so slight that it practically meant an unchanged price level for chemicals and allied products. From January through April the price movement was steadily upward. During that period the various consuming trades were operating actively and were taking chemicals and other raw materials in large volume. From April until the close of the year the price trend was downward and offset the gains made in the earlier period. An explanation for the downward price movement is found in lower producing costs as represented by lower selling prices for raw materials, keen competitive selling on the part of producers and distributors, and the influence of foreign-made chemicals which reached our markets in large volume. In many cases competition from imported chemicals was the predominant factor in depressing market values.

Heavy Imports of Chemicals

The higher import duties which became effective in September, 1922, failed to check the inflow from foreign countries, and official returns for the first 11 months of last year record gains in the dutiable commodities as well as in those selections that are accorded free entry. Overproduction abroad and low rates of exchange were factors that contributed to the inward movement of chemicals. In some cases these chemicals of foreign origin had little effect on market values in this country, as they were non-competitive, consisting of products that are not produced to any extent in this country. In other instances, however, imported offerings not only had a depressing effect on selling prices but also acted as a check on domestic production. This is exemplified in the case of nitrite of soda, where domestic manufacturers admitted that plants had been closed because of inability to meet the prices at which the foreign-made material was selling. Chlorate of potash production was affected in a similar manner and the same is true for permanganate of potash, prussiates and oxalic acid. Makers of citric and tartaric acids also were adversely affected by competition from importers, and foreign copper sulphate was offered in a way large enough to have an unsettling effect on domestic valuations.

As a result of the large volume of imports, domestic

Table I—General Statistics for the Chemical Industry: 1914 to 1921

	1921	1919	1914
Number of establishments	692	781	395
Persons engaged	58,640	88,490	37,881
Proprietors and firm members	150	148	99
Salaried employees	12,184	17,093	5,471
Wage earners (average number)	46,306	71,249	32,311
Primary horsepower	(*)	445,282	282,385
Capital	(*)	$659,480,247	$224,345,921
Salaries and wages	$88,893,688	132,424,167	31,086,915
Salaries	30,869,745	36,173,703	9,020,703
Wages	58,023,943	96,250,464	22,066,212
Paid for contract work	235,106	2,218,568	375,435
Cost of materials	190,502,119	280,298,013	89,450,694
Value of products	390,768,434	574,141,030	158,053,602
Value added by manufacture	200,266,315	293,843,017	68,602,908

Table II—Value of Chemical Products, by Industries and by Chemical Groups: 1921, 1919 and 1914

Industry or Chemical Group	1921	1919	1914
Total	$459,600,013	$685,268,285	$200,195,835
Industries			
The chemicals industry	454,373,920	574,141,030	158,053,602
Sulphuric, nitric, and mixed acid industry	21,462,920	31,470,480	15,215,474
Other industries—subsidiary chemical products	42,142,566	79,656,775	26,926,759
Chemical Groups			
I—Acids	$60,262,890	86,194,195	32,837,254
II—Nitrogen and fixed nitrogen compounds	21,059,976	26,973,983	9,869,637
III—Sodium compounds	83,698,199	99,689,828	32,626,335
IV—Potash and potassium compounds	4,934,749	18,407,253	7,905,744
V—Alums, aluminum, and compounds	23,243,824	43,433,482	*
VI—Bleaching compounds	13,900,353	12,392,806	5,302,359
VII—Coal-tar products	84,093,773	133,499,742	13,492,453
VIII—Plastics	58,836,711	77,477,041	13,895,784
IX—Compressed and liquefied gases	40,420,835	43,263,918	10,415,325
X—Chemicals not elsewhere specified:			
(a) Inorganic	63,568,998	84,530,613	36,520,217
(b) Organic	44,661,100	72,141,542	16,377,955
Group total, gross	498,681,408	698,004,403	*
Intergroup duplication	55,515,967	54,011,503	*
Total chemicals, net	443,165,441	643,992,900	191,895,464
Chemicals produced by the aid of electricity (included above)	58,180,506	82,590,005	29,661,949
Byproducts and residues of chemical operations†	4,810,803	25,923,661	4,409,620
Byproducts, not chemical‡	6,308,286	14,870,876	3,702,017
Amount received for contract work	89,390	480,848	188,734

* No comparable data.

† Paints and pigments, druggists' preparations, flavoring extracts, insecticides soaps and softeners, phosphoric material, etc.

‡ Tarred felts, candles, containers (including boxes, cartons, cylinders, and drums), fertilizers and fertilizer material, melting scrap, merchandise (goods sold in condition in which purchased), etc.

producers sought the aid of the Tariff Commission and asked higher customs duties in accordance with the flexible provisions of the present tariff act. Numerous investigations were made by representatives of the commission and attempts were made to obtain production costs in foreign producing centers as a basis of determining more accurately the merits of the various petitions for high tariff protection. After conducting investigations tariff hearings were granted by the commission. Among the materials on which hearings were held were nitrite of soda, chlorate of potash, casein, logwood extract, barbital and oxalic acid. Up to the end of the year the commission had rendered no report of its findings to the President and no changes in import duties were made.

Healthy Growth in Export Trade

Shipments of chemicals and kindred products to foreign countries made material progress during the year. Gains were reported both in valuations and in the tonnage movement. Some of the important consuming countries of Europe were not in a position to take their normal allotments and comparison with the totals for 1922 reveals important changes in the export situation as applied to different materials. For instance, the soda group reported a wider export business, yet there was a decided decline in shipments of caustic soda. The calcium group suffers in comparison with the export figures for 1922, and reduced amounts of potash products entered into our foreign trade. Acids and alcohols also are included on the debit side. The coal-tar chemicals were favored by developments which interfered with the German industry and far surpassed the totals for the preceding year. Fertilizer chemicals also added in large measure to the outward movement. In addition to a very large home consumption, pigments, paints and varnishes sold freely for export, overtopping the 1922 totals by about 50 per cent.

Arsenic Center of Attraction

The unusual conditions that surrounded the market for arsenic attracted wide attention to this material. Rapid growth in the use of calcium arsenate in the cotton-growing states made unheard of demands on arsenic supplies. Domestic production was rushed to greater extent than ever before. The record output at home, however, fell far short of contributing enough to fill consuming requirements and supplies in practically every producing country of the world were drawn upon to make up the deficiency. Under these conditions arsenic assumed a position of importance which made it one of the ranking chemicals of the year. New records were established in production, consumption, imports and price fluctuations.

The vast strides made in the arsenic trade during the year take on more significance when consideration is given to the report that less than 5 per cent of the cotton acreage was treated with calcium arsenate. Under favorable price levels consumption of calcium arsenate in 1924 is expected to double that of 1923. It can be seen, therefore, that the arsenic and arsenate industries are passing through a period of evolution and the progress made in 1923 merely emphasizes the potential demands of the future. In an effort to take all possible precautions to insure an adequate supply of arsenic, a meeting of representatives from the producing, consuming and trading branches of the trade was held in New York in December and received a report from the standing arsenic committee which reviewed developments of the year and pointed the way for progressive expansion in the arsenic trade.

Overproduction of Bleaching Powder

At the beginning of the year there was a scarcity of bleaching powder, which forced some buying of imported material. Domestic producers were sold ahead and the active consuming demand stimulated a widening of the output. This relieved the tension in the trading market, but resulted in a gradual accumulation of stocks at production centers. After the first quarter of the year consumption of bleach fell away and producers failed to check the volume of their operations until the weight of unsold stocks forced home the fact that overproduction had placed the industry in a precarious condition. The stability of prices was undermined in the summer months by efforts of sellers to reduce holdings by quoting private terms under the price levels as openly established. The difference between the quoted prices and those at which business was passing became so large that one of the leading producers revised his price schedule so as to bring it closer to the actual trading basis. Successive price reductions followed as selling pressure became more acute, until $1.25 per 100 lb. was the quoted figure for carlots at works. This was not the lowest price of the year, however, as large amounts of bleach changed hands under that price and at least a few transactions were closed on a basis of less than $1 per 100 lb.

Change in Method of Quoting Alkalis

From the inception of the alkali industry there has been a difference in expressing the strength and purity of these products. In Germany soda ash is quoted on a basis of the percentage content of sodium carbonate, and caustic soda is quoted on a basis of alkali content expressed in terms of an equivalent content of soda ash. In France soda ash is marketed according to Descroizille's degrees, giving the strength of soda ash in terms of the percentage of sulphuric acid which is chemically equivalent to the soda ash present, and caustic soda strength is expressed in terms of sulphuric acid equivalent. In England the New York and Liverpool test is used. Owing to the prominence of English alkalis in our early import trade, the latter test was adopted as the standard for trading when the domestic industry was established. The following table shows the different values for the same grade of caustic soda, according to the various methods of quoting:

Different Methods of Expressing the Same Grade of Caustic Soda

Actual Alkali Na_2O Per Cent	New York & Liverpool Na_2O Per Cent	German Degree Sodium Carbonate Na_2CO_3 Per Cent	French Degree H_2SO_4 Per Cent
60	61.93	102.58	94.84
70	72.26	119.69	110.64
74	76.39	126.52	116.97
76	78.45	129.94	120.13

In June one of the large domestic producers of alkalis announced that the former method of quoting prices would be no longer followed and that prices for caustic soda and soda ash would be named on a flat basis with actual test determining the strength and purity of the products. This was regarded with universal approval, as it simplified transactions in these basic chemicals, and this method has now been adopted in the domestic trade, thus marking one of the important trade developments of the year.

Gain in Output of Coal-Tar Products

Surplus Holdings of Tar Consumed at Plants. Benzene Market Easy on Decline in Gasoline

THE year marked further progress in production of coke in byproduct ovens, returns showing that the recovery of tar took on record proportions. According to latest statistics the output of byproduct coke reached the unprecedented total of 37,527,000 net tons, which compares with 28,500,000 net tons in 1922.

Production of coal tar in 1923 approximated 430,000,000 gal., comparing with 328,000,000 gal. in 1922 and 253,000,000 gal. in 1921. Because of the high prices for coal this vast output did not reach the open market, a large part of the production being consumed in the shape of fuel. The market for light oils was not high enough to warrant heavy expansion in production.

Based on production figures for coal tar, the 1923 output of light oils was estimated at 135,000,000 gal., which compares with 102,000,000 gal. in 1922 and 76,000,000 gal. in 1921.

Production of ammonium sulphate or equivalent in the past year reached about 590,000 tons, contrasted with 448,000 tons in the preceding year.

Domestic production of creosote found a ready market, the output, while larger, being insufficient for our requirements. The consuming industries were obliged to import freely and, according to official figures, the importations increased by 90 per cent.

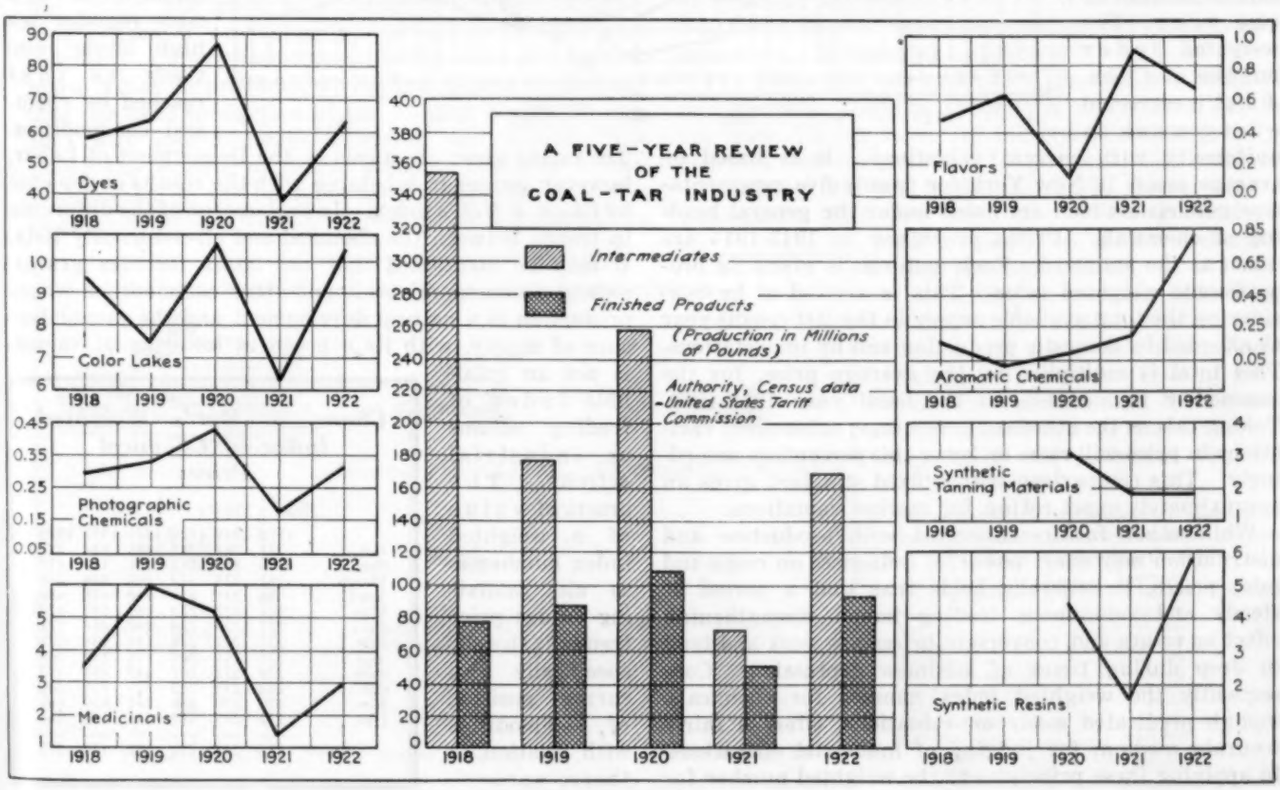
Benzene was more plentiful, and until the decline in prices for gasoline took place producers were favorably situated. The decline in the petroleum product forced down the market for benzene in all directions. Production of benzene, all grades, was estimated at 81,000,000 gal., which compares with 68,400,000 gal. in 1922. More than 80 per cent of the total quantity produced was consumed in the motor fuel field. Export demand was good, total exports for the year amounting to 14,000,000 gal.

Production of cresylic acid proved inadequate, and with the high tariff to contend with, consumers were forced to pay higher prices for part of their requirements. A more liberal interpretation of the tariff law, however, made it possible to import a mixture of cresylic acid and pitch free of duty, and this relieved the situation to a considerable extent before the year came to a close.

The first 6 months witnessed a strong market for naphthalene, supplies being tight on both crude and refined material. Later there were liberal offerings of crude from England and the Continent, and this caused a general recession in prices.

Demand for phenol was brisk and production of synthetic was resumed to meet the growing needs in the manufacture of phenolic resins.

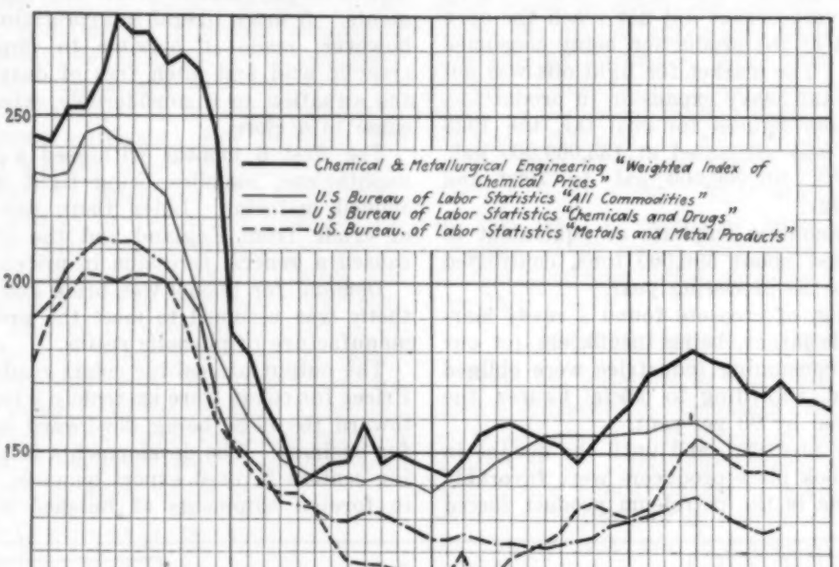
The output of coal-tar colors made further headway. Prices for colors were extremely irregular, the tendency toward the close being downward on keen competition for business. The developments in the German producing centers favored export business and a healthy gain in foreign shipments of finished products was made.



A Higher Average for Chemical Prices

Early Upward Price Trend Succeeded by Recessions, Which Made December Average the Lowest of the Year

ON the theory that prices for commodities depend upon the law of supply and demand and that upward swings to values are the result of greater trading activity, it may safely be stated that business in chemicals and allied products was along more active lines in 1923 than in the 2 years immediately preceding. The weighted index number of *Chem. & Met.* represents average of prices in 1923 at 173, which compares with averages of 155 and 152 for 1922 and 1921 respectively. Reference to the index number for the different months shows that the higher levels prevailed in the first half of the year, with declines in the latter half of the period. Interpreted in terms of volume, this would indicate a freer movement of chemical products in the earlier months of the year. The weighted index number of *Chem. & Met.* is corrected every week in uniformity with current valuations. It is based on average prices in New York for twenty-five representative materials which are listed under the general heading of chemicals. Prices prevailing in 1913-1914 are taken as the standard. Each material is given its proportionate weighted value. This is arrived at by considering the total available supply in the last census year as afforded by domestic production and by importations. This total is multiplied by the average price, for the commodity in question, in the fiscal year 1913-1914. Taking this as the standard percentage, subsequent variations in price will raise or lower this percentage accordingly. This comparison with a fixed standard gives an approximately exact rating for market valuations.



While other factors connected with production and distribution may exert powerful influences on costs and sales prices, it generally holds true that a period of steady and voluminous trading has a strengthening effect on values and, conversely, prices are weak and tend to drop during times of business depression. Consequently the weighted index number for chemicals, though predicated solely on valuations, offers a fairly accurate medium for judging of industrial operations. In applying these principles to the weighted number for the different months in 1923, it is found that the rising line coincides with trade reports, inasmuch as it occurs in the first half of the year, when the volume of business was admitted to be at its highest. The recession of the index number in December to the same general level as in the corresponding month of 1922 will not be taken as a reason for alarm, since the active trading movement prevalent in the early part of 1923 already had gained much headway in December, 1922. Wholesale prices for all commodities, as compiled by the Bureau of Labor Statistics and corrected through November, give a weighted number below the levels ruling monthly in 1922 and 1921. In other words, the all-commodity list based on wholesale prices for 404 commodities did not register as high levels relatively as that reached by chemical commodities. The rating given chemicals by the Department of Labor, however, agrees in substance with the results as depicted by *Chem. & Met.'s* index. In explanation of the difference in trends between the chemical and all-commodity lists, it may be mentioned that the latter includes grains, animal products, minerals and other commodities where production is a natural development and the preponderance of supply, with its consequent lowering of values, is not an infallible index of trading volume or industrial activity. The practical value of a weighted index number is to aid calulating future price trends. It tells specifically the current position of commodities with relation to the pre-war level.

Chem. & Met.'s Weighted Index of Chemical Prices

(Base = 100 for 1913-1914)

	1918	1919	1920	1921	1922	1923
Jan.	281	262	242	181	144	173
Feb.	285	250	252	166	148	178
March	281	233	252	157	156	178
April	286	231	261	140	158	180
May	267	227	279	143	159	178
June	272	229	274	147	157	177
July	277	231	274	148	156	171
Aug.	278	251	264	158	152	168
Sept.	278	272	267	147	148	172
Oct.	280	233	263	151	153	167
Nov.	279	239	240	147	159	166
Dec.	277	245	189	145	165	165
Average	279	242	255	152	155	173

Where Did the Sulphuric Acid and Caustic Soda Go in 1923?

Broad Distribution by Industries Shows Why These Commodities Have Become Known as Barometers of General Business

DURING the war, at the insistence of the War Industries Board, the Bureau of Mines undertook a comprehensive study of the uses of sulphuric acid in the various industries. Data on contracts of acid manufacturers with consumers were investigated and an accurate appraisal made of the wartime uses of this most important acid. Table I, taken from the publication "The Manufacture of Sulphuric Acid in the United States," by A. E. Wells and D. E. Fogg, shows the results of this study for 1918.

Table I—Distribution of Sulphuric Acid in the Industries, 1918

Industry	Acids Used, Tons per Month (Reduced to Basis of 100% H_2SO_4)	Tons per Year (Reduced to 50° Bé. Basis)	Percentage of Total Acid Used
1. Explosives (military and domestic)	140,000	2,700,000	36.0
2. Fertilizers	111,000	2,130,000	28.4
3. Oil refineries	35,000	671,000	8.8
4. Chemicals, drugs and ammonium sulphate	38,500	740,000	9.9
5. Steel pickling and galvanizing	36,500	700,000	9.3
6. Fabrics, textiles, etc	5,200	100,000	1.3
7. Paints, lithopone, glue, etc	5,300	104,000	1.4
8. Metallurgical, including storage batteries	15,200	292,000	3.9
9. Miscellaneous	3,800	73,000	1.0
Total	390,500	7,510,000	100.0

Statistics are not available for all of the production of sulphuric acid in the United States, but the Bureau of the Census has lately been engaged in a special quarterly census of production and stocks in the fertilizer industry. Using these figures as the basis for an estimate, it may be predicted with a fair degree of accuracy that the total production of the country (basis, 50 deg. Bé.) was approximately 6,000,000 tons during 1923. Using the Bureau of Mines estimate that the normal consumption in the manufacture of domestic explosives is approximately 10,000 tons per month and using the various indexes of industrial activity for the comparison of 1923 with 1918, it has been possible to arrive at the following estimate of consumption during the year just passed:

Table II—Estimated Distribution of Sulphuric Acid in the Industries, 1923

Industry	Tons of 50 Deg. Bé. Acid	Percentage of Total
Fertilizers	2,660,000	44.6
Oil refining	1,100,000	18.3
Chemical, celluloid, etc	740,000	12.3
Steel pickling and galvanizing	700,000	11.7
Metallurgical, including storage batteries	365,000	6.0
Paints, pigments, etc	130,000	2.0
Domestic explosives	125,000	2.0
Textile, fabric finishing	100,000	1.8
Miscellaneous	80,000	1.3
Total	6,000,000	100.0

What Becomes of Caustic Soda

The Geological Survey and the Census Bureau are authority for these figures on the production of caustic soda since 1899:

Year	Short Tons	Year	Short Tons
1899	167,000	1917	496,000
1904	87,000	1918	457,000
1909	131,612	1919	333,361
1914	291,539	1921	238,591
1916	392,000		

During 1917, the year of record output, the Division of Planning and Statistics of the War Industries Board was called upon to ascertain consumption in the various industries. It reported as follows:

(1) Soap, 23.1 per cent; (2) lye, 10.7 per cent; (3) miscellaneous chemical industries, 9 per cent; (4) textile trade, 7.9 per cent; (5) mineral oil refining, 4.3 per cent; (6) rubber working, 1.9 per cent; (7) cottonseed oil refining, 1.6 per cent; (8) U. S. Government requirements, 21.5 per cent; (9) Allied governments, 0.8 per cent, and (10) miscellaneous, 19.2 per cent.

In 1923 the situation had changed completely and an adjustment is necessary for peace-time requirements. Taking into consideration the important export trade, and the consumption data shown by the Census, we arrive at the estimates shown in Table III.

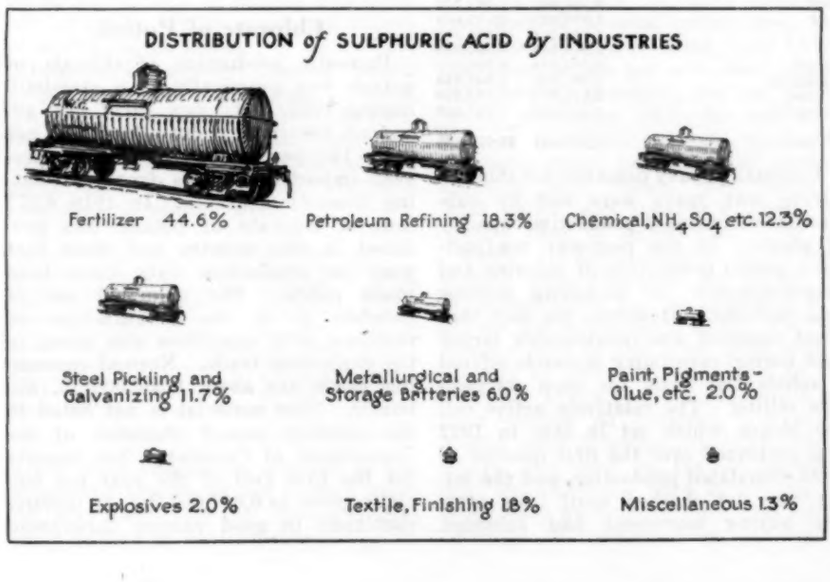


Table III—Estimated Distribution of Caustic Soda Production in 1923

Industry	Estimate of Tonnage	Percentage
Soap	86,000	24.5
Lye	55,000	15.7
Chemicals	50,000	14.3
Textiles	40,000	11.4
Petroleum refining	25,000	7.2
Vegetable oil refining	12,000	3.4
Rubber working	8,000	2.4
Miscellaneous	14,000	4.1
Exports	60,000	17.0
Total	350,000	100.0

Chemical and Material Markets in 1923

Bleaching Powder

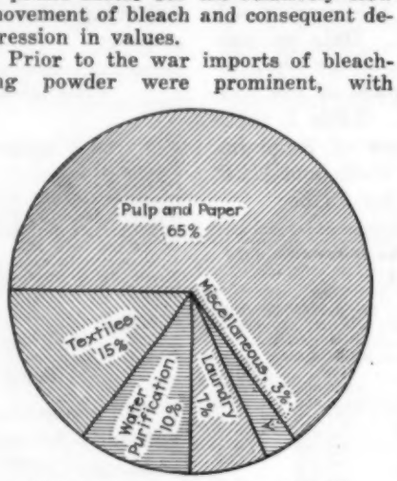
The outstanding feature was the price war which developed in the latter part of the summer and continued over the remainder of the year. From the time that bleach began to be manufactured in this country in 1897 up to the present year, prices were maintained on a fairly stable plane, with general revisions according as producing costs warranted such changes. It is true that market quotations were unsteady during the summer months in different years, but concessions granted were but temporary and grew out of the natural desire of holders to reduce stocks at a time when the goods are most likely to deteriorate in storage.

Last year there was the customary price-cutting in the hot weather period, accentuated by the fact that unsold stocks were larger than usual. The stimulus of low prices failed to increase consumption materially and early in September a prominent producer announced a decline in the carlot quotation which had been established at the beginning of the year. The decline merely brought the quoted price on a closer parity with the actual selling basis, but it aroused wide attention because it was generally construed as meaning that a low price level would rule during the last 4 months of the year. In October further cuts in price were made effective and contract prices for 1924 deliveries were named. The latter were admitted to be below the cost of manufacture and gave evidence of the demoralized condition of the market. Later revisions brought the price down to $1.25 per 100 lb. for drums in carlots at works, and this quotation applied to prompt shipments and to contracts covering deliveries over all of 1924. At the beginning of 1923 prompt shipment from works was quoted at $2.25 per 100 lb. and forward positions at $1.90 per 100 lb. Overproduction gave a plausible reason for price reductions, but lack of unity among producers and unrestricted competition were responsible for the quotations which disregarded production costs.

The fact that some manufacturers produce bleach by the electrolytic method makes it difficult for them to regulate their output without affecting production of the main product, caustic soda. By electrolysis caustic soda and chlorine are produced in about equal quantities, and this chlorine if used entirely in producing bleaching powder would result in an output of the latter nearly two and a half times that of the caustic soda turned out as the main product. Hence to cut down production of bleach it is necessary to restrict production of caustic soda or to use greater amounts of the chlorine in products outside of bleaching powder.

The paper industry is the largest consumer of bleach and is estimated to take normally 65 per cent of the annual production. The remainder of the output is distributed 15 per cent to the textile trade, 10 per cent for water purification, 7 per cent for laundry use, and 3 per cent in miscellaneous industries. The backward position of paper manufacturers in the summer and fall months was credited with being a prime factor for the relatively slow movement of bleach and consequent depression in values.

Prior to the war imports of bleaching powder were prominent, with



Distribution of Bleaching Powder by Industries

England and Germany as the chief contributing countries. For the past 7 or 8 years imports have been small and domestic material not only has supplanted the foreign but an important export trade has been built up as well. Canada is largest outside buyer of American bleach.

Exports for the year by months with comparisons for the preceding year were:

	1923 Lb.	1922 Lb.
January	4,266,919	1,843,706
February	3,730,546	1,683,229
March	2,592,068	2,419,432
April	3,501,692	2,742,727
May	2,959,905	3,635,669
June	2,584,201	4,833,705
July	2,569,848	4,805,388
August	2,292,534	4,700,111
September	1,692,366	2,949,034
October	2,616,974	3,537,354
November	1,415,637	3,784,009
Total	27,373,042	36,979,693

Unusually heavy demands for chlorine during war years were met by substantial increases in productive capacity of plants. In the post-war readjustment period production of chlorine and proportionately of bleaching powder was curtailed. However, the fact that plant capacity was considerably larger than normal consuming demands offered a substantial basis for keen competitive selling. The relatively active call for bleach which set in late in 1922 and continued over the first quarter of 1923 stimulated production, and the latter was not checked until long after the buying movement had subsided.

Official figures on 1923 production of bleach are not available, but private estimates place the output at close to 150,000 tons. Production figures according to census compilations show the following:

	Tons		Tons
1921	82,600	1914	150,190
1919	124,025	1909	58,401

Prices for bleaching powder in carlots f.o.b. works, showing high and low for the years mentioned, offer the following comparisons:

	High	Low		High	Low
1923	$2.00	$1.25	1920	$2.50	$2.10
1922	2.00	1.60	1919	2.00	1.25
1921	2.75	2.00	1918	6.50	1.25

Zinc Oxide

Producers reported a larger volume of business in zinc oxide. Increased demand came from both the rubber and paint industries. Because of the higher market for raw materials prices realized were higher than in 1922. The first 6 months found demand exceptionally active and this led to expansion in production. Demand, however, was not sustained and competition toward the close forced prices to the low point for the entire year. It is estimated that the rubber industry consumed close to 60 per cent of the year's production.

The range of prices on American process lead-free oxide, by months, for 1923, in cents per lb., follow:

	High	Low		High	Low
Jan.	$0.07½	—$0.07½	July	$0.08	—$0.08
Feb.	.07½	— .07½	Aug.	.08	— .08
Mar.	.07½	— .07½	Sept.	.08	— .08
Apr.	.08	— .07½	Oct.	.08	— .08
May	.08	— .08	Nov.	.08	— .07½
June	.08	— .08	Dec.	.06½	— .06½

Production figures on zinc oxide for 1923 will come out later. The output for the 2 preceding years, in short tons, follows:

	Lead-Free	Leaded
1922	99,444	30,460
1921	74,329	16,103

Chlorate of Potash

Domestic production of chlorate of potash was practically at a standstill during 1923. The new tariff law advanced the import duty from ½c. per lb. to 1½c. per lb., but this did not prevent imported chlorate from dominating domestic markets. In 1918 4,877 tons of chlorate of potash was produced in this country and since that year no production data have been made public. The principal use of chlorate is in the manufacture of matches, with quantities also going to the explosives trade. Normal consuming needs are about 9,500,000 lb. annually. This material is not listed in the monthly import statistics of the Department of Commerce, but imports for the first half of the year are officially given as 6,807,085 lb. As imports continued in good volume throughout

Chemical and Material Markets in 1923

the second half of the year, it is evident that foreign chlorate was in supply sufficient to take care of the entire domestic consumption.

Producers applied to the Tariff Commission for an advance in the duty, in order to permit of re-establishing the domestic industry. A hearing was granted by the commission, but no definite results were accomplished up to the close of the year.

Offerings of domestic chlorate were on the market continually, but asking prices were generally above those of importers, and consumers were influenced by economic reasons to favor the foreign product. Market prices showed the following range for the years enumerated:

	High	Low		High	Low
1923	$0.08	$0.07	1920	$0.18	$0.12
1922	.07½	.05½	1919	.41	.15
1921	.12	.05½	1918	.42	.39

Arsenic

Arsenic occupied a prominent position in the market throughout the year. This was due to heavy buying on the part of manufacturers of calcium arsenate. Calcium arsenate was first used to check boll weevil ravages in the cotton-growing states in 1919. Results were so satisfactory that a wide use in that field was looked for, but declines in the price of cotton checked buying of the poison and demand did not reach large proportions until late in 1922. At that time urgent call for arsenic resulted in enlarging domestic production and operations at the beginning of 1923 were on a scale that promised a record output for the year.

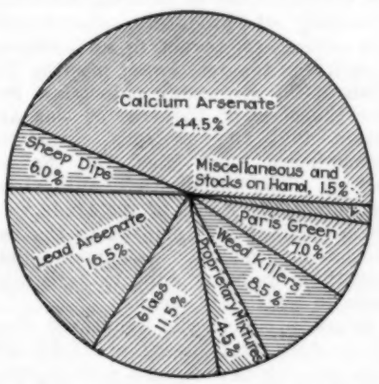
In the first 6 months of the year the home output of arsenic was 6,035 tons of refined and 1,183 tons of crude. This was at the rate of 25 per cent increase over 1922, when total production was 8,905 tons of refined and 1,122 tons of crude. For the 12-month period, production of arsenic was officially estimated at 14,184 tons. This was made up of 12,192 tons of refined and 1,992 tons of crude. Total output was valued at $2,966,753 at works.

Imports of arsenic reached record proportions during the year. Japan, Germany, Canada, Mexico, France, Belgium, Australia, Brazil and the Dominican Republic contributed the major part of this supply. Imports according to months were:

	Lb.	Value
January	1,879,639	$177,533
February	2,115,339	112,634
March	1,392,289	166,978
April	1,476,066	153,366
May	2,118,338	218,228
June	2,365,475	255,233
July	1,212,354	111,631
August	1,335,402	115,369
September	1,480,482	123,770
October	1,393,368	116,833
November	1,566,775	145,079
Total	18,335,527	$1,695,654

The most noteworthy change in the consuming branch of the arsenic market was found in the increased call from makers of calcium arsenate. In 1922 approximately 8,000 tons of arsenate was shipped to the cotton-growing states. This represents an arsenic content of 3,600 tons. In the "cotton year" Sept. 1, 1922, to Sept. 1, 1923, production of calcium arsenate was approximately 17,000 tons with an arsenic content of 7,650 tons. Domestic production in that period was approximately 9,000 tons and imports 8,250 tons, giving a total supply of 17,250 tons.

Consumption of arsenic for the 1922-23 cotton year is estimated as follows: calcium arsenate, 7,650 tons; lead arsenate, 2,850 tons; glass, 2,000 tons; weed killers, 1,500 tons; paris green, 1,200 tons; sheep dips, 1,000 tons; proprietary mixtures, 800 tons. This makes a total of 17,000 tons, the difference between that amount and the total supply as represented by production and imports being accounted for by miscellaneous uses and by stocks of arsenic on hand at the close of the fiscal year.



Distribution of Arsenic by Industries

The rapid increase in consumption of arsenic for the manufacture of calcium arsenate places special emphasis on the importance of that field in calculations regarding the future of the industry. The enormous possibilities of expansion are indicated from the fact that of a total cotton area last season of 38,287,000 acres, only 1,674,000 acres, or 4.4 per cent, was treated with calcium arsenate, the use of the latter averaging 18.5 lb. per acre. Factors in trade estimate that with favorable price, production of calcium arsenate next season may reach a total which will require a supply of arsenic close to 25,000 tons.

Prices for white arsenic in the spot market were 15½@16c. per lb. at the beginning of the year as compared with 6c. per lb. in January, 1922. For the greater part of the year there was a scarcity of domestic grades due to the fact that producers sold practically all their output on contract. Imported grades were in larger supply than ever before, but were so readily absorbed that unsold stocks were large only at such times as holders were restricting offerings in anticipation of higher prices. Most of the domestic output was sold direct to consumers, but the influx of imported grades invited speculative operations.

The high and low prices for white arsenic during the year with comparisons for preceding years follow:

	High	Low		High	Low
1923	$0.16	—$0.08½	1920	$0.16	—$0.10
1922	.15½	— .06	1919	.10	— .08
1921	.10	— .05½	1918	.16	— .09

Lithopone

Good business was experienced in the market during the past year, actual consumption being even larger than in 1922. Higher manufacturing costs necessitated a general upward revision in prices, the selling schedule holding firm until the last month of the year. In December the situation eased off on increased competition among producers, freer offerings of foreign material and lower prices for barytes of foreign origin.

Latest figures on production are those for 1922 given out by the U. S. Geological Survey. The production in 1922 amounted to 166,720,000 lb., which compares with 110,032,000 lb. in 1921. Importations in 1922 amounted to 21,525,824 lb., against 10,493,938 lb. in 1921.

High and low prices for lithopone, by months, cents per lb., for the past 2 years, follow:

	1923		1922	
	High	Low	High	Low
January	$0.06½	—$0.06½	$0.06½	—$0.06½
February	.06½	— .06½	.06½	— .06½
March	.07	— .06½	.06½	— .06½
April	.07	— .06½	.06½	— .06½
May	.07	— .07	.06½	— .06
June	.07	— .07	.06½	— .06
July	.07	— .07	.06½	— .06
August	.07	— .07	.06½	— .06½
September	.07	— .07	.06½	— .06½
October	.07	— .07	.06½	— .06½
November	.07	— .06½	.06½	— .06½
December	.06½	— .06½	.06½	— .06½

Nitrite of Soda

Domestic production of nitrite of soda, which had its beginning during the war period coincident with the development of the dye industry, received a setback during the past year. At the beginning of the year there were three producing companies, but their plants were closed for a large part of the period, due to unwillingness to compete with imported material at prevailing market prices. Hence the home output in 1923 was very small and the major part of consuming requirements was taken care of by imported nitrite.

Normal consumption of nitrite of soda in this country is estimated to be 6,000,000 lb. annually, nearly all of this being used in the manufacture of azo dyes and in the dyeing of textiles. The capacity of domestic plants is sufficient to produce about 5,000,000 lb., but the largest output reached was in 1918, when 3,402,000 lb. was made in American plants. It is estimated

Chemical and Material Markets in 1923

that the 1923 production was little if any in excess of 1,000,000 lb.

Imports of nitrite, on the other hand, showed a decided gain over the preceding year, although they suffered in comparison with the totals for 1920, in which year the record output of dyes brought about importations of 11,690,000 lb. of nitrite. With this exception imports in 1923 were the largest in the history of the trade. Germany and Norway are the chief foreign countries from which we import nitrite. Statistics of exports from Germany show that in the first half of the year that country exported 1,873,576 lb. of nitrite to the United States.

Detailed figures of imports for December are not yet at hand, but the following gives arrivals for the 11 months ended November:

	Lb.	Value
January	662,787	$28.974
February	465,197	21.208
March	845,651	38.502
April	652,382	28.359
May	851,258	36.199
June	169,850	6.996
July	134,583	8.454
August	391,841	17.924
September	123,499	5.039
October	78,537	3.174
November	226,983	9.316
Total	4,602,568	$204,295

At the beginning of the year imported nitrite was offered at 8c. per lb., while domestic makers were asking 9c. per lb. and upward for their product. The market held fairly steady until early in the summer months, but the trend was toward lower levels and attempts of domestic sellers to meet the prices of importers caused declines until open quotations of 7½c. per lb. were heard in July. Market values were easy from that point until late in the year, when imported grades were more firmly held and offerings of domestic origin were too limited in volume to be a factor. At the close of the year asking prices were 8@8½c. per lb. The following gives high and low prices for the past 6 years:

	High	Low		High	Low
1923	$0.10	$0.07½	1920	$0.30	$0.12
1922	.10	.06	1919	.21	.11
1921	.10	.06	1918	.42	.19

As a result of competition from imported nitrite, a petition for an increase of 50 per cent in the existing duty were made by one of the domestic producers. The Tariff Commission granted hearings on this petition and in addition to the evidence submitted by the petitioner data collected abroad by representatives of the commission were introduced. Late in the year a prominent importing company filed suit against the Tariff Commission in which access was demanded to all records filed with the commission in the petition for an increase in duty. In the meantime no recommendation regarding a change in duty on nitrite to the President regarding a change in duty on nitrite was made by the commission.

Alcohol

Increased business was reported by producers of industrial alcohol. Production of denatured alcohol in 1923 was even greater than in 1917 and prices moved upward, closing at the high point for the year. The higher prices reflected, in part, the advance in the market for raw materials. Early in the year stocks were ample, the surplus holdings resulting in unsettled and rather low prices.

The year also marked definite progress in the way of furthering distribution of alcohol for industrial purposes. A committee was appointed by the Commissioner of Internal Revenue, consisting of producers, distributors and consumers, to act in an advisory capacity on the question of meeting the needs of the consuming industries. Before the close of the year it was apparent that the advisory committee accomplished much good for the industry. The prohibition authorities recognized the wants of the trade to a greater extent and pointed to the expansion in production as evidence that everything is being done to assist the trade in legitimate spirits.

Actual production of denatured alcohol in 1923 was placed at 57,565,000 wine gal., which compares with 23,000,000 wine gal. in 1922 and 55,680,000 wine gal., the previous high mark set in 1917.

The gain in consumption could be traced to the addition of many formulas for denatured alcohol, enabling former consumers of ethyl spirits to change over to the industrial product. Virtually no progress was made in furthering distribution of alcohol as fuel for internal combustion motors, the severe drop in prices for gasoline accounting for suspension in this direction.

High and low prices by months, for denatured alcohol, formula No. 5, 188 proof, in bbl. (6c. less per gal. for drums, drums extra), follow:

	1923 High	1923 Low	1922 High	1922 Low
January	$0.38	$0.37½	$0.40	$0.36
February	.38	.37½	.36	.34
March	.38	.37½	.34	.34
April	.38	.37½	.34	.25
May	.40	.37½	.28	.25
June	.40	.40	.31	.28
July	.42½	.40	.31	.31
August	.42½	.42½	.32	.31
September	.44½	.43	.34	.34
October	.46½	.44½	.36	.36
November	.50½	.46½	.36	.36
December	.50½	.50½	.38	.36

Methanol—Production was increased to meet the growing demand. Prices eased off a little toward the close on freer offerings, but the range for the year was higher than in 1922. Estimated production of methanol for the past year was placed at 8,600,000 gal., which compares with 6,799,500 gal. in 1922. The output of methanol, in gal., by months, with a comparison, according to figures announced by the United States Department of Commerce, was as follows:

	1923	1922
January	888,608	494,981
February	726,037	483,439
March	786,774	569,450
April	710,987	450,529
May	796,481	458,739
June	727,458	484,822
July	645,673	510,489
August	649,063	506,930
September	568,091	521,782
October	664,708	640,266
November	739,497	795,879
December	.....	882,142
Total	*7,901,377	6,799,438

* 11 months ended Nov. 30.

The high and low price for each month, for the past 2 years, for 95 per cent methanol, in bbl., per gal., follows:

	1923 High	1923 Low	1922 High	1922 Low
January	$1.23	$1.13	$0.56	$0.55
February	1.23	1.21	.55	.54
March	1.19	1.19	.54	.52
April	1.21	1.19	.52	.52
May	1.18	1.18	.52	.52
June	1.18	1.18	.52	.52
July	1.18	1.18	.52	.52
August	1.18	1.13	.52	.52
September	1.05	1.05	.64	.52
October	.98	.93	.86	.64
November	.93	.93	.98	.86
December	.93	.93	1.13	.98

Oxalic Acid

Keen competition between domestic and imported makes was in evidence throughout the year. This was particularly noted at Eastern points, where freight rates were more favorable for the foreign-made product. As a result of this competition prices were reduced in the latter half of the year and petitions for tariff investigations with a view to increasing the duty were made on behalf of domestic manufacturers and were met by requests of importers for a reduction in the duty. A study of production costs here and abroad was made by representatives of the Tariff Commission and a hearing was held before the commission at which evidence was submitted by the interested parties, but no recommendation had been made to the President up to the end of the year.

Domestic production of oxalic acid in 1922 was 3,973,807 lb. Imports from Jan. 1 to Sept. 21 were 29,767 lb. and from Sept. 21 to the end of the year 1,260,308 lb. arrived from foreign markets, making imports for the year 1,290,075 lb. and thus giving a total supply of 5,263,882 lb. At the beginning of 1923 there were three domestic manufacturers of oxalic acid, but one of these stopped producing in March and total output for the year was estimated to have decreased about 20 per cent as compared with the preceding year. This was more than counterbalanced by the increase in arrivals from abroad, so the total supply was larger than in 1922. Prior to the war domestic consumption ranged from 6,000,000 lb. to 8,000,000 lb. a year, hence it is evident that demand has been less active in recent years. In the pre-war years imported acid furnished the bulk of requirements, as domestic production was on a small scale.

Chemical and Material Markets in 1923

Imports in the past year, by months, were as follows:

	Lb.	Value
January	534,893	$43,353
February	157,279	12,338
March	228,025	17,157
April	129,737	10,770
May	385,279	30,683
June	145,851	11,091
July	172,925	12,892
August	160,402	11,925
September	157,394	15,826
October	186,809	13,268
November	144,262	10,852

Prices for domestic and imported grades were in close conformity throughout the year. The price trend was downward, as the highest figures were named in the early part of the period. Early in January imported grades were offered in the spot market at 13¼c. per lb. with domestic makers asking 13½c. per lb. at works. Irregular price declines followed, with a recovery in the latter part of April, which brought prices back to levels quoted at the beginning of the year. In June the market again weakened, with imported offerings leading the decline, and values gradually sank to a level where both imported and domestic grades were available at 11¾c. pr lb. High and low prices for the past 6 years follow:

	High	Low		High	Low
1923	[$0.13½	$0.11¾	1920	$0.55	$0.18
1922	.17	.11	1919	.39	.22½
1921	.23	.12½	1918	.45	.35

Phenol

Surplus stocks were absorbed early in the year and the growing demand soon uncovered an extremely tight situation. Production of natural phenol was all sold on contract and the "outside" market reported business at steadily rising prices. The sharp uplift in the market attracted the attention of former producers of the synthetic product and plans were laid to increase the output in more than one direction. The leading factor in production of phenolic resins announced that phenol would be produced in quantity before the end of the year and surplus material will be offered to the trade. The prospects for increased production curtailed buying and prices developed weakness in June. Most of the natural phenol was sold ahead around 28c. per lb. During May second hands reported sales of odd lots as high as 55c. per lb. By October both natural and synthetic sold down to 25c. per lb. December prices were quite firm on reports that new production had been curtailed, the market at 25c. being unprofitable to some of the factors in synthetic material.

The range of prices for U.S.P. phenol, by months, in cents per lb., for the past 2 years, follows:

	1923 High	1923 Low	1922 High	1922 Low
Jan.	$0.34	—$0.28	$0.11¾	—$0.11
Feb.	.35	— .34	.12	— .11½
Mar.	.45	— .40	.12½	— .12
Apr.	.53	— .50	.13	— .12½
May	.55	— .53	.12½	— .12
June	.45	— .42	.14	— .12½
July	.42	— .30	.13	— .12
Aug.	.30	— .29	.17	— .14
Sept.	.29	— .27	.20	— .17
Oct.	.27	— .25	.28	— .22
Nov.	.25	— .24½	.34	— .28
Dec.	.26	— .25	.34	— .28

Naval Stores

Early in the year prices for spirits of turpentine advanced because of the heavy domestic demand and uncertainty surrounding supplies. In April business went through at $1.60 per gal., the price being within 4c. of the high for 1922. Crop news improved later and the subsequent gain in production eased the market considerably.

Rosins fluctuated within narrow limits, with the tendency downward, final quotations being the lowest for the year.

Turpentine prices in the New York market, in bbl., per gal., by months, follow:

	1923 High	1923 Low	1922 High	1922 Low
January	$1.54	—$1.45	$0.92	—$0.84
February	1.53	— 1.43	.92	— .90
March	1.56	— 1.45	.87	— .85
April	1.60	— 1.40	.86	— .85
May	1.12	— 1.12	.96	— .92
June	1.07	— .95	1.48	— .96
July	.94	— .94	1.25	— 1.20
August	.96	— .94½	1.30	— 1.16
September	.99	— .98	1.34	— 1.23
October	1.01	— .98	1.64	— 1.36
November	.98	— .95	1.64	— 1.54
December	.93½	— .92	1.50	— 1.40

Common strained rosin, high and low prices by months, for the past 2 years, per bbl., follow:

	1923 High	1923 Low	1922 High	1922 Low
January	$6.15	—$6.15	$5.40	—$5.30
February	6.15	— 6.10	5.40	— 5.25
March	6.15	— 6.10	5.25	— 5.15
April	6.20	— 6.10	5.30	— 5.15
May	5.90	— 5.85	5.30	— 5.30
June	5.90	— 5.80	5.60	— 5.50
July	5.80	— 5.80	5.80	— 5.60
August	5.75	— 5.75	6.25	— 5.80
September	5.85	— 5.75	6.25	— 6.20
October	5.85	— 5.80	7.00	— 6.60
November	5.80	— 5.70	6.90	— 6.40
December	5.70	— 5.55	6.30	— 6.15

White Lead

Record consumption of paints accounted for the active demand for white lead, production of the lead pigment showing substantial gains contrasted with 1922. The high market for pig lead, acetic acid and fuel were given as reasons for the higher trading level. The close of the year witnessed a strong situation in the metal. Leading producers sold lead pigments on a guarantee against decline basis, and, this policy resulted in a more uniform distribution of goods.

High and low prices, in cents per lb., for standard dry white lead, basic carbonate, by months, for the past 2 years, follow:

	1923 High	1923 Low	1922 High	1922 Low
January	$0.08¼	—$0.08¼	$0.07¼	—$0.06¾
February	.09¼	— .08¼	.07¼	— .07
March	.09¼	— .09¼	.07¼	— .07¼
April	.09¼	— .09¼	.08	— .07¼
May	.09¼	— .09¼	.08	— .07¼
June	.09¼	— .09¼	.08	— .07¼
July	.09¼	— .09¼	.08	— .07¼
August	.09¼	— .09	.08	— .07¼
September	.09¼	— .09	.08¼	— .08
October	.09¼	— .09	.08¼	— .08
November	.09¼	— .09	.08¼	— .08¼
December	.09¼	— .09	.08¼	— .08¼

According to figures compiled by the U. S. Geological Survey the production of white lead, not including sublimed, and red lead, for the 5 years ended with 1922 was as follows:

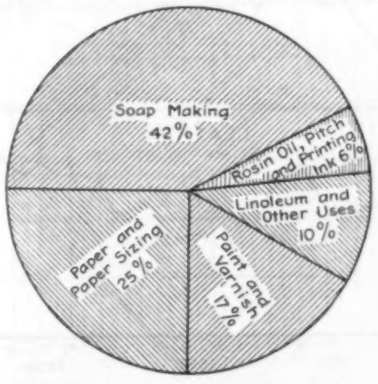
	White Lead Short Tons	Red Lead Short Tons
1922	194,991	30,509
1921	170,283	21,805
1920	145,695	*34,431
1919	139,090	*32,362
1918	102,888	*30,069

* Figures include orange mineral.

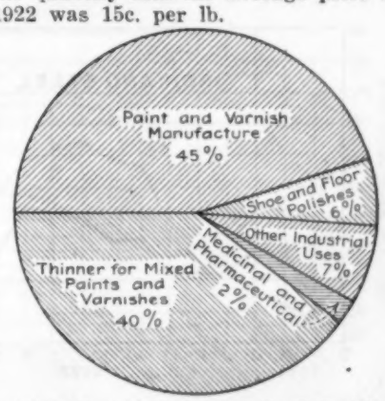
Production of litharge in the United States in 1922 was placed at 58,261 short tons, against 41,909 short tons in 1921. The output of orange mineral in 1922 was 370 short tons, compared with 381 short tons in 1921.

Aniline Oil and Salt

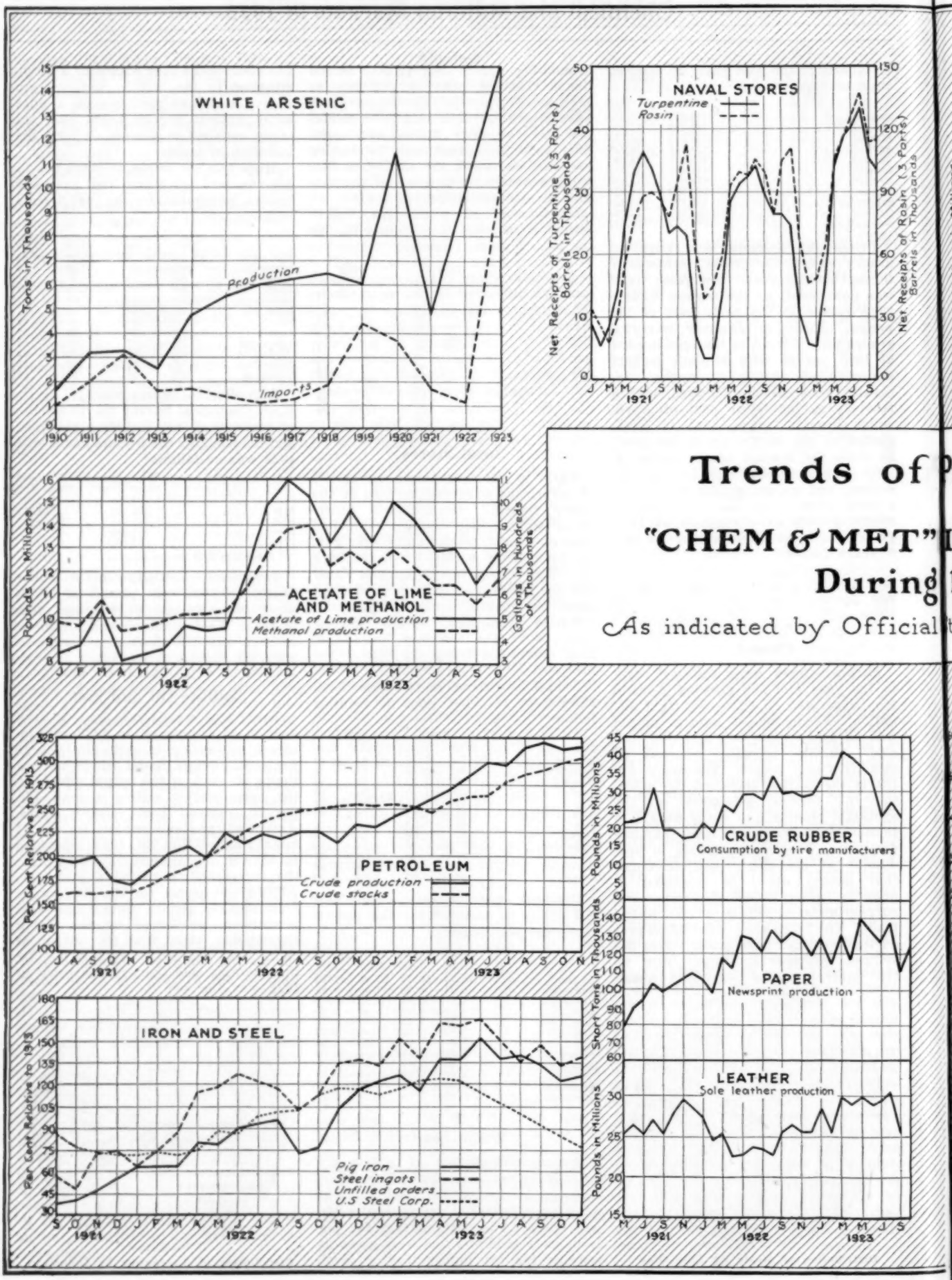
There was a moderate gain in production of aniline oil in 1923, the increase amounting to approximately 10 per cent. Prices moved within narrow limits, the bulk of the output offered in the open market selling around 16c. per lb. carload basis, drums extra. Aniline oil and salt exports for the 11 months ended Nov. 30, 1923, amounted to 487,680 lb., against 338,984 lb. for the corresponding period a year ago. Aniline salt prices for the year range from 22@24c. per lb. Latest figures on production, as issued by the Tariff Commission, show that the output of oil in 1922 reached 21,401,864 lb. Of the quantity sold the average price in 1922 was 15c. per lb.


Soap Making 42%
Rosin Oil, Pitch and Printing Ink 6%
Linoleum and Other Uses 10%
Paint and Varnish 17%
Paper and Paper Sizing 25%

Distribution of Rosin by Industries


Paint and Varnish Manufacture 45%
Shoe and Floor Polishes 6%
Other Industrial Uses 7%
Medicinal and Pharmaceutical 2%
Thinner for Mixed Paints and Varnishes 40%

Distribution of Turpentine by Industries



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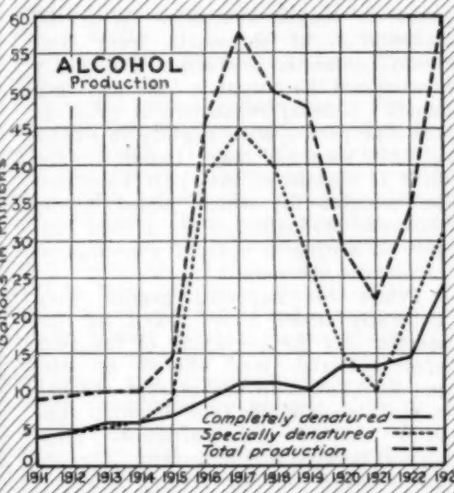

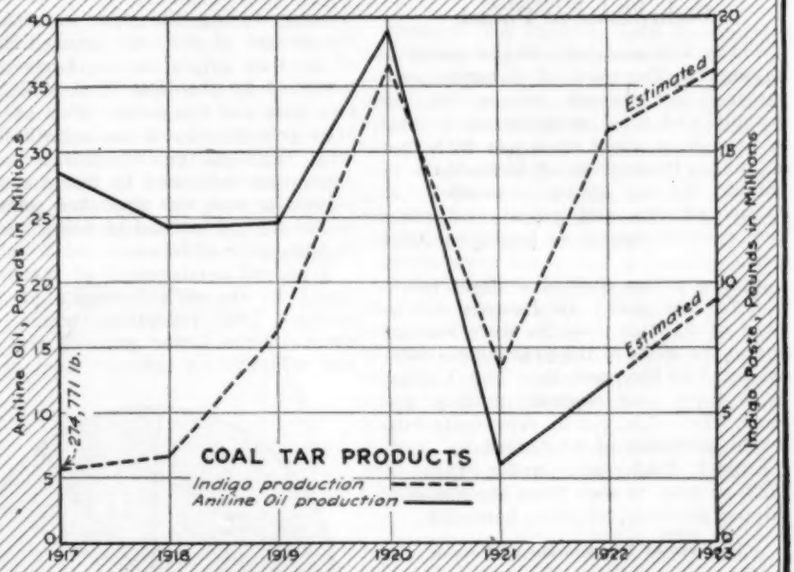

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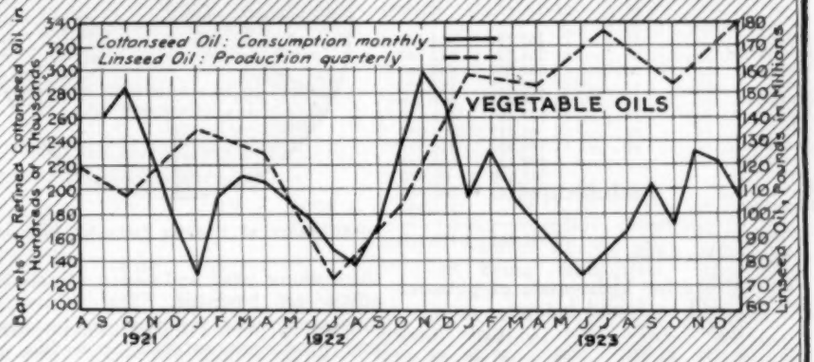
VEGETABLE OILS
Cottonseed Oil: Consumption monthly
Linseed Oil: Production quarterly
Barrels of Refined Cottonseed Oil in Hundreds of Thousands
Linseed Oil, Pounds in Millions
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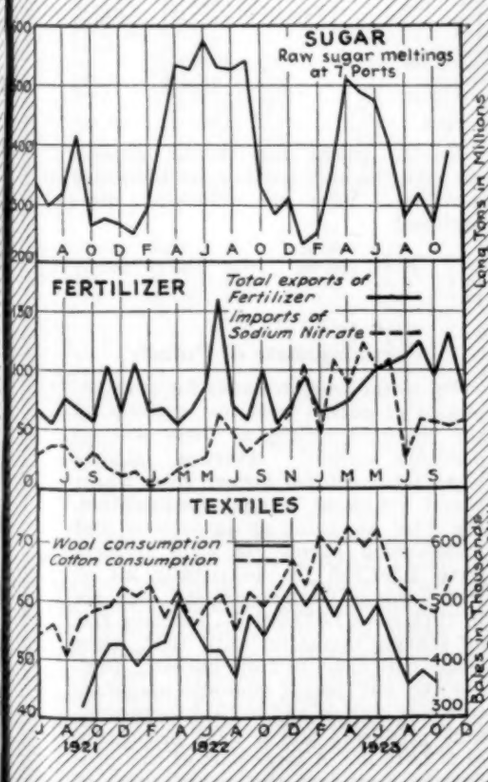
1921 1922 1923


SUGAR
Raw sugar meltings at 7 Ports
FERTILIZER
Total exports of Fertilizer
Imports of Sodium Nitrate
TEXTILES
Wool consumption
Cotton consumption
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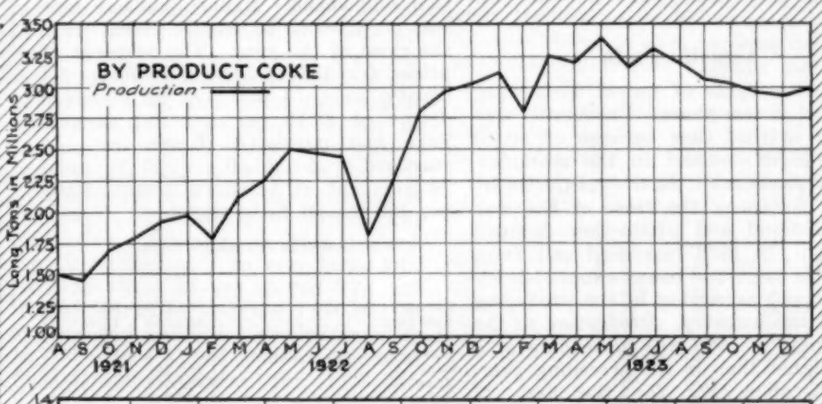
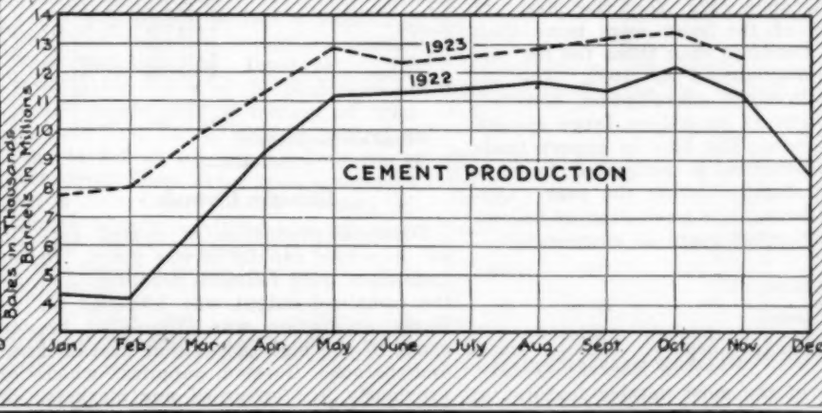
1921 1922 1923





Chemical and Material Markets in 1923

Bichromate of Potash

There was moderate improvement in buying on the part of domestic consumers, but export orders fell off sharply and total consumption is said to have been about on a par with that of 1922. Production of bichromate of potash is not given separately in census returns and private estimates give current output as less than 5,000 tons.

Selling prices showed a slight recession for the year. In January quotations of 9¾@10c. per lb. were current and at the close of the year sellers were asking 9¼@9¾c. per lb. The highest price level was reached in May and June, when 11¼c. per lb. represented the inside quotation of producers.

Export trade was under that of 1922, as may be seen from the amounts shipped monthly, as given herewith:

Exports of Bichromate of Potash

	1923 Lb.	1922 Lb.
January	269,196	564,571
February	361,321	542,849
March	1,033,857	648,086
April	240,678	535,275
May	198,883	467,560
June	127,493	418,419
July	41,517	316,090
August	146,863	314,535
September	170,156	157,743
October	307,690	89,070
November	144,207	260,918
December	*	115,092
Total	3,041,861	4,430,208

*Amount not yet reported.

Quotations for bichromate of potash, per lb., will be found below:

	High	Low		High	Low
1923	$0.11½	$0.09½	1920	$0.50	$0.17
1922	.10¼	.09½	1919	.40	.22
1921	.15	.10	1918	.48	.37

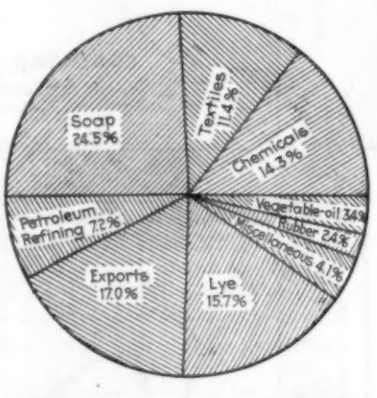
Caustic Soda

Record outputs of caustic soda were reported in war years. Production was rushed at that time because of added consumptive demand in the manufacture of picric acid. In the readjustment period following the close of the war both demand and production declined sharply. In 1922 increased call from domestic users and heavy export buying encouraged expansion in the producing end of the industry. Production in the early part of 1923 was proceeding at a rate higher than in the preceding year. Export shipments for the first 11 months of the year were more than 15,000 tons less than those for the corresponding period of 1922. The increase in home consumption, however, is thought to have been large enough to overcome the loss in export trade and production is estimated to have gained slightly during the year. Official returns place production as follows for the census years as enumerated:

	1921	1919	1914
No. of establishments	35	22	25
Total production, tons	238,591	312,736	.....
For sale, tons	230,896	302,121	291,539
Value	$16,628,400	$18,691,047	$9,104,920

One of the most notable features to trading during the year consisted in the discard of the time-honored custom of quoting prices on the basis as established by the New York and Liverpool test and the substitution of a flat price referring to the actual alkali content. This change, which was made in June, was welcomed by the consuming industries and was approved generally as the logical method of doing business in this basic chemical.

A second development of the year is found in the establishment of lower prices. This reduction, which came about in the latter part of the year, was effective on contract business for the coming year and had a stimulating effect on business. The contracting movement was reported to be heavy and producers entered upon the new year with a large part of their production sold ahead. Export business also was reported to be more active toward the close of the year. The schedule of prices for 1924 contracts quotes solid caustic soda 76 per cent in standard drums at $3.10 per 100 lb.; ground, flake and powdered 76 per cent in standard drums, $3.50 per 100 lb.; solid 74 per cent in standard drums, $3.02 per 100 lb., all f.o.b. works.



Distribution of Caustic Soda by Industries

Exports of Caustic Soda

	1923 Lb.	1922 Lb.
January	7,891,279	10,917,529
February	7,405,064	12,469,192
March	9,855,416	18,612,225
April	12,284,777	15,017,777
May	11,269,945	21,235,175
June	9,996,569	11,355,908
July	11,288,716	7,829,303
August	9,604,318	10,497,417
September	8,397,968	8,016,992
October	7,498,635	8,605,123
November	9,559,114	12,343,838
December	*	9,838,927
	105,051,801	146,739,406

*Total not yet available.

Caustic Potash

Domestic production of caustic potash increased rapidly in war years. In 1918 there were fourteen producers and the combined output was 1,984,847 lb. Home production was stimulated because of the high prices that prevailed and because German supplies, which previously had governed our markets, were no longer available. With the resumption of shipments from Germany, domestic production practically ceased and the output in 1923 was very small. Normal requirements prior to the war period were slightly in excess of 4,000 tons per year. Imports in the first 11 months of last year amounted to 8,991,145 lb., which, added to the domestic production, gives a total supply, indicating a present consumption of about 5,000 tons.

Prices for imported grades were generally under those asked for domestic. At the beginning of the year spot material was offered at 6⅞c. per lb. Later on the market reached a high level of 8¼c. per lb., with supplies limited and shipments from abroad delayed and uncertain. Foreign goods were offered freely, however, during the major part of the year and the volume of imports shows to what extent preference was given to such offerings. Nevertheless domestic caustic found a market in spite of the premium that was asked. Free offerings of imported in the latter half of the year caused prices to weaken and the closing quotation was 6⅝c. per lb. for spot goods and 6¼c. per lb. for forward positions. Domestic caustic closed at 9c. per lb. f.o.b. works.

Imports of caustic during the year are shown below, the total for December being lacking:

Imports of Caustic Potash

	Lb.	Value
January	1,005,080	$55,988
February	345,570	21,503
March	832,034	49,701
April	941,519	61,072
May	1,489,354	102,760
June	1,121,677	75,006
July	226,269	17,979
August	760,149	58,604
September	683,755	44,186
October	670,146	41,866
November	915,592	51,662
Total	8,991,145	580,327

Quoted prices for caustic potash, showing the high and low for the years mentioned, offer the following comparisons:

	High	Low		High	Low
1923	$0.08½	$0.06½	1920	$0.28	$0.13½
1922	.06½	.05	1919	.70	.29½
1921	.13½	.04½	1918	.83	.67

Permanganate of Potash

Up to the war, demands for permanganate of potash were met entirely by the imported article, as there was no domestic output. Average imports were about 500,000 lb. per year, which would represent annual consumption, the chief use being as an oxidizer and a bleaching agent. In 1914 imports were 1,351,855 lb., practically all of which was of German origin. Imports in 1915 were 1,039,304 lb., but they fell off sharply thereafter until 1922, when 856,067 lb. came in from abroad. During the war period domestic manufacture was started and in 1918 there were nine producers and a total production of 562,416 lb. A large part of this production went into the manufacture of

Chemical and Material Markets in 1923

saccharin. Statistics for production since 1918 are not available, but there was a decline in the post-war period and domestic production has been irregular.

Imported permanganate was in control of the market and established trading levels. The opening quotation was 16c. per lb. This soon gave way to higher prices as spot supplies dwindled and there was considerable uncertainty about securing shipments from Germany. Values had appreciated to 23½c. per lb. by April and the higher price level influenced a producer in the Middle West to begin production. The trend of prices then turned downward and larger offerings of imported permanganate brought about a 17c. trading basis, which broke sharply toward the close when demand slowed up and stocks were pressed for sale at 14c. per lb. Comparison of high and low prices for the past 6 years follows:

	High	Low		High	Low
1923	$0.23½	$0.14	1920	$0.80	$0.55
1922	.22	.12	1919	1.25	.50
1921	.55	.12	1918	4.00	1.25

Soya Bean Oil

The high tariff was instrumental in restricting importations of soya bean oil from the Orient. Europe was the principal buyer. Consumption of this oil in the United States reached a peak in 1918, when more than 325,000,000 lb. was imported. In 1922 the imports dropped to 17,294,000 lb., and the 1923 total approximates 45,000,000 lb. The paint industry consumed most of the oil imported in the past year.

Tank-car price in 1923 of crude soya bean oil, duty paid, by months (per lb.), f.o.b. N. Y., follows:

	High	Low		High	Low
Jan.	$0.10½	—$0.10	July	$0.09½	—$0.09
Feb.	.10½	— .10½	Aug.	.09	— .08½
Mar.	.10¼	— .10½	Sept.	.09½	— .09½
Apr.	.11	— .10½	Oct.	.09½	— .09½
May	.10½	— .10½	Nov.	.10½	— .10½
June	.10½	— .09½	Dec.	.10½	— .10¼

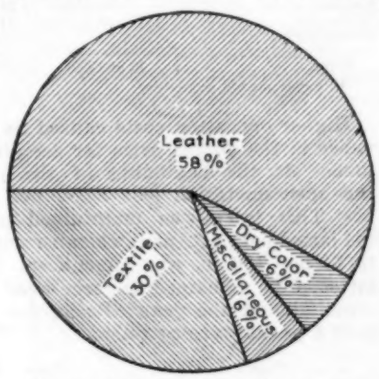
Importations of crude soya bean oil, in lb., by months, with a comparison, follow:

	1923	1922
January	1,261,899	.....
February	541,880	.....
March	2,668,495	1,014,173
April	3,762,341	808,005
May	12,647,370	2,045,738
June	7,492,546	3,904,328
July	3,758,759	4,106,895
August	6,779,216	2,692,440
September	2,145	1,233,564
October	689,920	1,609,750
November	85,120	95,000
December	.....	1,015,620
Totals	*41,660,110	17,294,094

*11 months.

Bichromate of Soda

In common with many other chemicals, bichromate of soda found a dull market through the hot weather period. The tanning industry was inactive and was slow to recover from the slump. Operations at plants producing bichromate were affected accordingly and production did not run along on an even basis. Some plants were reported to have operated only at intervals during the year and trade estimates place total production as approximating 23,000 tons. The price for chrome ore held at relatively high levels and with production in New Caledonia greatly curtailed, the bulk of requirements was filled with Rhodesian and other ores. Scarcity of labor was reported at times as a factor in lessening output of bichromate and costs in general were high, although selling prices did not vary much from those of the preceding year. Statistics for production, according to census returns were:



Distribution of Bichromate of Soda by Industries

	1921	1919	1914
No. of establishments	9	5	4
Total production, tons	18,169	24,081	.....
For sale, tons	18,169	22,992	11,824
Value	$3,823,456	$5,337,389	$1,125,398

Opening quotations were on a basis of 7¾c. per lb., but the volume of business which developed created a strong market and values rose to 8½c. per lb. in May, with production well sold up. The slowing up in business that followed allowed stocks to accumulate and prices eased off and in the fall months some contracts were placed as low as 7c. per lb. There were open quotations of 7½c. per lb. f.o.b. works, and this quotation was held up to the end of the year. The latter quotation was misleading, however, in this regard, that it applied only to very large lots. In some cases sellers quoted 7½c. per lb. on contracts involving 1,000,000 lb. or over and adopted a graded scale up to 7⅝c. per lb. on smaller amounts. Considerable business for 1924 delivery was placed in last 4 months of the year and the immediate outlook was regarded as favorable. The scarcity of material in possession of second hands was a feature of trading and first hands were in control of the market at all times. Imports of bichromate have never been prominent, but a fair export business exists, although separate returns are not made in the official figures.

Comparative prices, per lb., show the following:

	High	Low		High	Low
1923	$0.08½	$0.07½	1920	$0.33	$0.09½
1922	.07½	.06½	1919	.40	.07
1921	.08½	.07½	1918	.30	.16

Cresylic Acid

Demand for cresylic acid increased, but there was no appreciable gain in domestic production until late in the year and prices in the spot market advanced sharply in the period covering the first 6 months. Domestic production sold on contract around 80c. per gal. on the 97 per cent grade, and it was on imported and resale lots that exorbitant prices were paid.

Steps were taken for a reduction in the duty on foreign goods. A more liberal interpretation of the tariff law permitted free entry to a mixture of cresylic acid and coal-tar pitch, and this resulted in a larger output of refined material and subsequent weakness in prices.

Spot quotations, high and low by months, on 97 per cent acid, with a comparison, follow:

	1923		1922	
	High	Low	High	Low
Jan.	$1.00	—$0.90	$0.65	—$0.65
Feb.	1.70	— 1.00	.65	— .63
Mar.	1.45	— 1.35	.65	— .63
Apr.	1.30	— 1.25	.60	— .56
May	1.25	— 1.22	.56	— .56
June	1.20	— 1.08	.56	— .56
July	1.02	— .90	.56	— .56
Aug.	.90	— .85	.56	— .56
Sept.	.85	— .75	.58	— .56
Oct.	.75	— .75	.72	— .58
Nov.	.75	— .70	.85	— .75
Dec.	.75	— .70	.95	— .90

Naphthalene

A strong situation developed in the first 6 months of the year, available supplies being inadequate. But the rise in prices stimulated production and at the same time brought out rather liberal offerings from foreign sources. The heavy importations were a feature in the market and prices eased off to what traders generally accepted as a "normal" level. Crude naphthalene for import brought from 2¼@2⅜c. per lb., c.i.f. New York.

Refined white flake, in carload lots, sold from 5¾@9½c. per lb., the high figure obtaining in May. High and low prices on flake, by months, for the past 2 years, follow:

	1923		1922	
	High	Low	High	Low
Jan.	$0.06	—$0.05½	$0.06½	—$0.06
Feb.	.06½	— .06	.06½	— .06
Mar.	.06½	— .06½	.06½	— .06
Apr.	.09	— .08	.06½	— .06½
May	.09½	— .09	.06½	— .06½
June	.08½	— .07½	.06½	— .06½
July	.07½	— .07	.06½	— .06
Aug.	.07	— .07	.06	— .06
Sept.	.07	— .06½	.06	— .06
Oct.	.06½	— .06½	.06	— .06
Nov.	.06½	— .06½	.06	— .05½
Dec.	.06	— .06	.05½	— .05¼

Importations of naphthalene, by months, in lb., for the past 2 years, follow:

	1923	1922
Jan.	1,694,300	214,793
Feb.	850,608	176,580
Mar.	2,492,992	.....
Apr.	1,798,425	274,815
May	2,826,925	317,434
June	1,730,436	492,279
July	3,167,958	89,600
Aug.	963,775	47,070
Sept.	1,545,952	105,043
Oct.	734,598	348,660
Nov.	1,311,945	450,639
Dec.	.....	627,419
Totals	*19,108,884	3,144,332

* 11 months ended Nov. 30.

Chemical and Material Markets in 1923

Acetate of Lime

Wood chemical plants were operated on a larger scale in 1923 and production of acetate of lime rose sharply above that of 1922. There was an increase in stocks on hand, so it becomes evident that the increase in consumption did not keep pace with the gain in output. Returns of manufacturers to the Department of Commerce present the following comparison of production, shipments and stocks on hand:

Production of Acetate of Lime

	1923 Lb.	1922 Lb.
January	15,690,729	8,548,314
February	13,449,759	8,841,406
March	14,956,598	10,462,128
April	13,698,154	8,141,593
May	14,822,716	8,400,243
June	14,298,075	8,591,572
July	13,043,572	9,670,504
August	12,828,897	9,459,098
September	11,541,468	9,571,953
October	12,730,563	11,998,276
November	14,357,614	14,886,260
December*	.....	15,922,819
Total	151,418,145	108,571,347

*Figures not yet available.

Shipments of Acetate of Lime

	1923 Lb.	1922 Lb.
January	16,261,472	9,113,578
February	13,635,149	8,337,090
March	16,440,430	10,949,385
April	14,869,803	11,873,250
May	17,937,601	14,227,764
June	13,940,133	16,176,544
July	13,046,991	17,817,323
August	7,723,885	15,678,578
September	8,167,900	12,627,053
October	12,107,927	11,914,056
November	13,771,472	15,169,774
December*	.....	19,533,670
Total	147,902,763	143,884,395

*Figures not yet available.

Stocks of Acetate of Lime

	1923 Lb.	1922 Lb.
January	14,112,842	57,281,460
February	14,448,647	57,843,236
March	12,898,779	57,296,877
April	11,889,803	52,464,416
May	9,004,287	46,221,838
June	9,632,775	36,824,416
July	9,606,398	28,859,858
August	14,331,455	22,168,318
September	17,667,615	18,538,318
October	18,404,932	18,495,325
November	19,065,125	18,236,795
December*	.....	15,282,629

*Figures not yet available.

In the absence of official figures for operations in December, 1923, the position of the industry for the first 11 months, as compared with the corresponding period of 1922, may be expressed as follows:

	11 Mo. 1923 Lb.	11 Mo. 1922 Lb.	Per Cent of Gain or Loss
Production	151,418,145	108,571,347	+39.4
Shipments	147,902,763	143,884,395	+ 2.7
Exports	20,603,620	25,385,649	—10.8
Domestic consumption	127,299,143	118,498,746	+ 7.4

In the above tabulation, shipments are taken as representing consumption, and total shipments, less the amounts exported, are used to represent domestic consumption. The greater part of acetate of lime production is used in the manufacture of acetic acid, acetone, acetone oil and methyl acetone. In 1919, of the output, amounting to 168,956,000 lb., about 9 per cent was consumed at the place of manufacture.

Exports of acetate of lime failed to come up to expectations and compare unfavorably with those for 1922. Exports by months were as follows:

	1923	1922
January	1,574,018	1,370,507
February	1,553,355	1,617,702
March	1,964,833	2,541,897
April	4,448,824	3,645,869
May	2,941,470	3,234,211
June	3,018,617	4,100,406
July	2,946,051	3,115,168
August	625,593	1,791,820
September	222,772	1,466,815
October	336,000	1,768,630
November	1,424,157	732,624
December*	.....	2,210,350
Total	20,603,620	27,596,106

*Figures not yet available.

Higher operating costs caused an advance in the quoted price for acetate of lime. At the beginning of the year the open quotation was $3.50 per 100 lb. This price was maintained until the latter part of April, when a revision to $4 per 100 lb. was announced. The latter price remained in force over the remainder of the year. Prices for the past 6 years were as follows:

	High	Low		High	Low
1923	$4.00	$3.50	1920	$3.50	$2.00
1922	3.50	1.75	1919	3.05	2.00
1921	2.00	1.50	1918	6.50	3.00

Soda Ash

As in the case of caustic soda, the most important development of the year consisted in the change of method in quoting prices. In June the New York and Liverpool test, which had been followed for years, was discarded and producers announced that thereafter a flat price would be named in transactions involving soda ash. The new method met with approval of buyers and sellers and offers many advantages over the involved quotations that were formerly used.

There was a good demand for soda ash throughout the year. Export buying was practically on a par with that for the preceding year. The movement from works varied somewhat according to the position of consuming industries, but total deliveries were large enough to hold production on a high plane, with private estimates placing the output for the year at a slight gain over the total for 1922. Production figures for soda ash in the census years mentioned below offer the following comparisons, the figures being on the authority of the Census Bureau:

	1921	1919	1914
No. of establishments	19	18	10
Total production, tons	959,523	1,507,424	.....
For sale, tons	776,328	1,033,480	935,305
Value	$29,347,426	$31,195,149	$10,937,945

No definite figures can be given for production in 1922, but there was a very decided gain over the total as recorded for 1921 and with the increase in output still in evidence in 1923, it is probable that total output for the year was well over 1,000,000 tons.

The soap trade bought heavily of soda ash during the year and contracts for round lots were held by glass makers, pulp and paper producers, chemical manufacturers and various other users. Export business also held up well and a review of the outward shipments each month reveals that the total for the first 11 months of the year was larger than for the corresponding period of 1922.

Exports of Soda Ash

	1923 Lb.	1922 Lb.
January	2,919,108	2,432,113
February	2,234,976	2,358,210
March	2,420,934	2,411,745
April	1,812,275	2,495,408
May	2,498,887	2,524,823
June	2,464,540	1,898,908
July	2,910,538	2,822,017
August	2,360,567	2,925,022
September	2,882,502	2,147,965
October	2,348,273	1,999,481
November	2,983,399	2,601,568
December	*	3,010,314
	27,837,449	29,627,574

* Total not yet available.

Opening prices for light ash in single bags were $1.75 per 100 lb. for spot carlots and the contract price was $1.20 per 100 lb. in single bags and $1.40 per 100 lb. in bbl. f.o.b. works, all on basis 48 per cent. These prices held practically unchanged until the substitution of flat prices for the basis quotation. In the latter part of October contract prices were announced for 1924 deliveries and they were lower than those they replaced. The new contract prices on light ash were: $1.25 per 100 lb. in bulk, $1.38 per 100 lb. in bags, and $1.63 per 100 lb. in bbl., carlots f.o.b. works. Spot and prompt material was quoted at 5c. per 100 lb. above the contract price.

Prussiate of Soda

The outstanding feature in the market for prussiate of soda was the wide fluctuation in prices. Starting the year at 18½c. per lb., fractional advances were made and then the price began to drop until the latter part of the year, when sales of spot goods were put through at 10c. per lb. The closing price was 11¼c. per lb. For the greater part of the year imported material set the market price, but in the closing months the domestic product was on a competitive basis and according to reports some domestic producers are in a position to turn out this product at prices low enough to give greater prominence to the home product. In the first half of the period domestic production was irregular, with plant operations regulated according to the volume of business received. While prices were high, consumption was curtailed and, as in the case of prussiate of potash, preference was given to lower priced competing materials. Production was given an impetus later in the year, but in the absence of definite figures it is stated that total output was below the figures for 1917,

Chemical and Material Markets in 1923

1918 and 1919, when production was 4,173 tons, 4,525 tons and 3,437 tons respectively.

Imports in 1922 amounted to 3,832,491 lb. and based on returns for the first 11 months, imports in 1923 were only about one-third that much. A much smaller indicated total supply, therefore, was available in 1923, which bears out reports of smaller consumption. Imports for the first 11 months are shown as follows:

Imports of Prussiate of Soda

	Lb.	Value
January	257,817	$45,116
February	115,487	23,231
March	129,475	24,385
April	100,905	17,607
May	100,263	17,915
June	69,453	11,441
July	33,797	4,708
August	44,851	6,019
September	68,067	8,657
October	78,778	9,528
November	50,000	6,368
Total	1,048,953	$174,975

Price ranges for prussiate of soda for the past 6 years were:

	High	Low		High	Low
1923	$0.18½	$0.10	1920	$0.33	$0.17½
1922	.23½	.15½	1919	.33	.16
1921	.17	.11½	1918	.60	.33

Tartaric Acid

Reduced output of raw materials necessary for the manufacture of tartaric acid, preference shown for competing products and offerings of imported grades at lower prices have combined to restrict domestic production of this acid. In 1919 the home supply of tartaric was reported at 5,312,965 lb. Imports for that year were 654,736 lb., thus giving a total supply of 5,967,701 lb. Figures of production since 1919 have not been issued. Imports of tartaric acid for the 11 months ended November were 2,356,335 lb. This amount is far in excess of importations in pre-war years and establishes the relative importance of the foreign product in our markets.

In the first quarter of the year demand was fairly good and prices for both imported and domestic grades were held practically on the same level. Foreign markets then eased off and the price range between domestic and foreign increased. In the latter part of the period the price advantage was so strongly in favor of the imported that the latter attracted the majority of buying orders.

Imports of Tartaric Acid

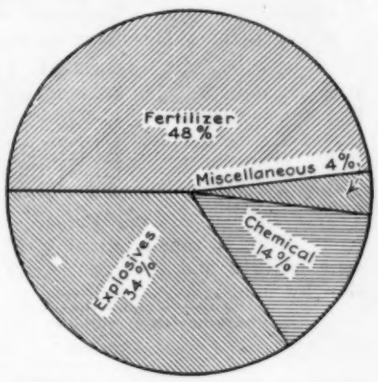
	Lb.	Value
January	111,748	$27,940
February	44,921	5,146
March	100,352	23,315
April	22,400	5,404
May	250,891	62,214
June	393,332	106,266
July	280,000	66,520
August	119,696	33,504
September	189,304	45,770
October	485,493	123,084
November	358,198	82,861
Total	2,356,335	$582,024

Price fluctuations throughout the year were numerous. The upward swing to values in the first quarter was checked in May and values dropped consistently from then until the end of the year. The range in values for the past 6 years is shown in the following:

	High	Low		High	Low
1923	$0.37½	$0.26	1920	$0.80	$0.60
1922	.31	.24	1919	.86	.65
1921	.48	.25	1918	.92½	.77

Nitrate of Soda

Production of nitrate of soda in Chile is placed at about 2,000,000 metric tons in 1923. This shows that the output was up to the 10-year average. Shipments also were larger than in the preceding



Distribution of Sodium Nitrate by Industries

year and stocks were reduced. Stocks in Chile at the close of the year were 881,000 tons, which represents a decline of close to 400,000 tons during the year. Labor troubles at times checked maximum production, but the number of oficinas in operation at the close of the year was much larger than in January. Shipments to the United States in the last half of the year were comparatively small, amounting to but 236,000 tons, as compared with shipments of 1,194,000 tons to Europe and Egypt. Shipments to other countries in the same period were 46,000 tons.

Imports into the United States for the first 11 months of the year were nearly 50 per cent larger than arrivals for the entire year preceding. Imports by months compare as follows:

Imports of Nitrate of Soda

	1923 Tons	1922 Tons
January	109,064	9,470
February	86,302	19,160
March	121,134	23,452
April	98,577	29,891
May	107,329	64,130
June	25,204	49,442
Jult	58,196	33,307
August	56,637	42,474
September	51,543	52,081
October	56,788	67,929
November	30,456	105,954
December	*	45,174
	803,899	542,464

* Data not yet available.

In May prices for nitrate for the nitrate year 1923-24 were fixed by the association of producers in Chile. The schedule quoted $2.45 per 100 lb. for July - August - September shipments; $2.47½ per 100 lb. for October; $2.50 per 100 lb. for November; $2.52½ per 100 lb. for December; $2.55 per 100 lb. for January; $2.60 per 100 lb. for March to June. Prices in the spot market varied with periods of weakness when stocks were plentiful, and with higher prices during scarcity. In the latter part of the year spot holdings were light and asking prices were strong at $2.50 per 100 lb.

Citric Acid

The higher duty on citrate of lime which went into effect in September, 1922, had a very depressing effect on importations of that product. This did not bring about any big gain in shipments of citric acid from foreign markets, as may be seen by comparing import figures for 1923 with the total for the preceding year. Imports in 1922 were 1,624,892 lb. and in the 11 months ended November, imports in 1923 were but 775,570 lb. This would indicate smaller production by plants located at Eastern points, where citrate of lime is used as a raw material for the acid, and also tends to show a lessened consumption, since both domestic production and imports from abroad were under the levels of the preceding year. Figures for Western production, where producers are independent of citrate of lime supply, are lacking and it is difficult to estimate to what extent this production made up for the decline in output in other sections.

According to census figures domestic production of citric acid for the census years as enumerated was:

	1921	1919	1914
No. of establishments	5	6	3
Total production, lb.	3,892,189	3,260,482	2,729,943

While the above registers an increase in output for 1921, the comparison is less favorable when referred to production in some of the interim years, as reports of producers to the Tariff Commission place manufacture at 4,032,897 lb. in 1917, 4,183,538 lb. in 1916, and 3,417,795 lb. in 1915.

One of the most important developments of the year relates to the failure of the workings of the Camera Agrumaria in Sicily. This organization was in control of the marketing of citrus products of that large producing country. It operated under government sanction and took over the output of producers at a price fixed by the government and the latter also established the sales price. Under this arrangement no flexibility in price was possible and stocks accumulated to such an extent as to cause financial difficulties. At the close of the fiscal year, Nov. 30, the existing arrangement was modified so as to place the Sicilian products on a competitive price basis in the world's markets.

Prices for citric acid were firm in the early part of the year, with offerings in light supply. Opening prices of

Chemical and Material Markets in 1923

Arsenic Sales in 1923, 14,184 Tons

Total arsenic sales in 1923, including both crude and refined, amounted to 14,184 short tons, valued at $2,966,753, or an average value of 10½c. per lb. These figures are based on returns made to the U. S. Geological Survey. The total was made up of 12,192 tons of refined or 99.5 per cent or purer material and 1,992 tons of 70 to 92 per cent material. On Oct. 1, 1923, stocks in the hands of domestic producers were very low, amounting to not more than 200 tons of refined arsenic.

49½c. per lb. soon gave way to higher schedules and sales were made as high as 52c. per lb. This refers to imported acid, as domestic producers maintained quotations at 49@50c. per lb., which were largely nominal in view of the sold-up condition of their output. In the latter part of the year the market weakened. Domestic acid was offered at 48@49c. per lb. and imported sold down to 46@46½c. per lb. Comparison of high and low prices for previous years is shown below:

	High	Low		High	Low
1923	$0.52	$0.46	1920	$1.20	$0.60
1922	.50	.42	1919	1.25	.55
1921	.55	.42½	1918	1.25	.71

Imports of Citric Acid

	Lb.	Value
January	57,904	$17,884
February	15,904	5,021
March	152,880	45,012
April	84,224	26,432
May	168,220	54,954
June	112,115	34,919
July	33,600	11,536
August	67,200	11,719
September	.....	.....
October	24,908	83,075
November	448	223
Total	775,570	$237,463

Sulphur

Of prime interest to the sulphur trade was the agreement entered into between American and Sicilian producers. After numerous meetings this agreement was consummated in the early part of the year. It is to continue until Sept. 30, 1926, and may be renewed. The agreement applies to unrefined sulphur, and its purpose is to regulate distribution in the markets of the world. According to this trade compact North America will be supplied by American producers and Italy by the Sicilian producers. Demands from other consuming countries will be prorated between the two groups of producers.

While figures for domestic production of sulphur in 1923 are lacking, it is stated that the tonnage was larger than in 1922. One estimate credits an increase of about 30 per cent in consumption of sulphur in the acid plants of fertilizer companies. Production of sulphur prior to 1923 is shown in the following table, together with quantities shipped from mines:

	Mined, Long Tons	Shipped, Long Tons
1922	1,830,942	1,343,624
1921	1,879,150	954,344
1920	1,255,249	1,517,625
1919	1,190,575	678,257
1918	1,353,525	1,266,709
1917	1,134,412	1,120,378

The difference between totals for production is largely accounted for by stocks on hand in producers' possession, and it will be noted that these stocks were increased in each of the abovenamed years with the exception of 1920, when shipments exceeded production.

Exports of sulphur increased in recent years, the totals being as follows:

	Long Tons	Value
1923	450,679*	$6,774,533
1922	485,664	7,095,628
1921	285,762	4,524,768
1920	477,450	8,994,350
1919	224,712	6,325,552
1918	131,092	3,626,638

*For 11 months ended November.

The Bureau of the Census, on a basis of total consumption of 570,769 tons in 1919 and 1914, gives distribution by industries as follows:

Consumption of Sulphur

	1919, Tons	1914, Tons
Chemicals	153,018	52,679
Coal-tar chemicals	10,308	
Sulphuric, nitric and mixed acids	99,930	3,617
Explosives	25,797	15,832
Fertilizers	221,558	2,041
Petroleum refining	5,241	2,035
Other industries	54,917	6,044
Total	570,769	82,248

Prices for crude sulphur f.o.b. mines have held on a steady basis in the past 2 years, with $16 per ton the open quotation, and export values have been maintained at $18 per ton f.a.s. New York.

Dye Imports at New York

The imports of coal-tar dyes for December, 1923, totaled 202,704 lb., with an invoice value of $212,851. The following table shows the monthly imports through the port of New York for the year 1923:

Month	Lb.	Value
January*	179,309	$185,344
February	191,709	199,690
March	312,809	301,436
April	242,022	256,751
May	261,869	292,340
June	247,174	257,803
July	144,687	142,428
August	173,164	194,164
September	124,665	128,544
October	267,556	257,084
November	278,673	289,689
December	202,704	212,851
Preliminary total	2,631,341	$2,718,124

*Not complete.

Production of light oil and derivatives from byproduct coke oven operations in 1922, according to the Tariff Commission census, follows:

Crude light oil, gal.	*102,118,000
Benzene, crude, gal.	1,937,000
refined, gal.	9,359,000
motor, gal.	57,117,000
Toluol, crude, gal.	38,000
refined, gal.	1,846,000
Solvent naphtha including xylene, gal.	2,845,000
Other light oil products, gal.	579,000

*Of this amount 75,554,000 gal. was refined to make products listed.

High and low prices for 90 per cent benzene, by months, cents per gal., tank cars, works, for the past 2 years, follow:

	1923		1922	
	High	Low	High	Low
Jan.	$0.30	—$0.27	$0.27	—$0.26
Feb.	.27	— .27	.27	— .27
Mar.	.27	— .27	.27	— .27
Apr.	.27	— .27	.27	— .27
May	.27	— .26	.27	— .27
June	.26	— .25	.27	— .27
July	.25	— .25	.27	— .26
Aug.	.25	— .25	.27	— .26
Sept.	.25	— .24	.27	— .27
Oct.	.25	— .23	.27	— .27
Nov.	.21	— .21	.28	— .27
Dec.	.21	— .21	.27	— .27

Benzene

Expansion in consumption of benzene as a motor fuel was experienced in 1923, but with production augmented and gasoline much lower in price than in the preceding year, the tendency of prices was downward. There was a moderate gain in consumption of the 90 per cent and pure grades, while export business also improved, contrasted with a year ago.

Official figures on production will not be available for some time to come, but private estimates on the 1923 output place the total at 81,000,000 gal., which compares with 68,400,000 gal. in 1922. According to the census of dyes, 57,117,000 gal. of benzene was consumed in the shape of motor fuel in 1922, leaving 9,359,000 gal. for distribution as refined and 1,937,000 gal. as crude.

The exports of benzene for the 11 months ended Nov. 30 amounted to 102,192,810 lb., valued at $3,272,194, which compares with 64,600,735 lb., valued at $2,353,136, for the corresponding period a year ago.

Calcium Arsenate

Interest in this material was greater than in any previous year. Heavy losses to the cotton crop from weevil and other damage had led to experimental work that proved that calcium arsenate was more effective than any other remedy in checking losses of this nature. Consumption of arsenate, therefore, was unusually large. In a report made to the arsenic trade in December, it was stated that total consumption of calcium arsenate for the cotton year ended Aug. 30 was 34,000,000 lb., or practically twice the amount used in 1922. The possible field for this poison may be inferred from the statement that only 4.4 per cent of the cotton acreage received arsenate treatmnt. This gives a very bright outlook for consumption in future years and foretells a growing production for arsenate if it can be produced at prices attractive to cotton growers. So great was the call for arsenate at times that reports credited one of the large cotton-

Chemical and Material Markets in 1923

growing states with considering the production in quantities large enough to supply the needs of that state. In the matter of production, considerable progress was made in producing direct from arsenic-bearing ores.

The position of arsenic had much to do with establishing market prices for arsenate, and fluctuations in the raw material were reflected in the finished product. Quotations for arsenate ranged from 11c. per lb. to 20c. per lb. Wide interest was drawn to reports that the state of Georgia had placed a contract for 10,000,000 lb. of arsenate at 10c. per lb. This report had a foundation of truth, but the contract was not consummated. Contract prices for 1924 delivery ranged from 11½c. to 14c. per lb., but the outside figure was not attractive and the inside price was closer to the trading level.

Efforts were made during the year to import calcium arsenate, but the few shipments that reached this country were not satisfactory in quality and there is little hope of building up an import trade in this material. The question of removing arsenate from the dutiable list was considered; but pending definite action it was generally held that the results would not warrant raising obstacles to disturb possible expansion in the home industry.

Prussiates of Potash

Reduced outlets in consuming trades and steadily declining prices stand out in the history of these products for the past year. For the greater part of the period the differential between the potash and soda compounds was in favor of the latter, and this had a restricting influence on sales of the former. Moreover, some of the larger consuming industries failed to take their normal quotas and in the dry color the substitution of cyanides cut heavily into the demand for prussiates. Production figures for yellow prussiates of potash have not been given since 1918, in which year three producers turned out a total of 457,267 lb. This compares with outputs of 3,510,208 lb. and 3,204,684 lb. respectively for the census years of 1909 and 1914. In the latter part of 1923 domestic production had gained some headway and there was more of a disposition, at least on the part of one producer, to compete with the imported material.

The price trend was distinctly downward throughout the year. This resulted from the slow trading movement, aided by lower producing costs and because of the keen competition that developed between the foreign and domestic product. Red prussiate was very inactive at the beginning of the year and quotations of 85c. per lb. were little more than nominal. Values gradually dropped until late in the year holders were willing to sell at 42c. per lb. This means that values had been practically cut in two, and the percentage of decline was far in excess of that for the general chemical list. Yellow prussiate opened at 39c. per lb. and in December sold at 21½c. per lb., which shows how drastic was the fluctuation in this chemical.

While imported prussiates offer keen competition and generally led the way in price declines, the amounts brought in from foreign markets were relatively light. The evolution that has been going on in the prussiate industry may be inferred from the fact that imports in 1914 were 3,508,229 lb., as compared with 515,633 lb. in 1922 and 391,577 lb. for the first 11 months of last year. Nor has this decline in importations been compensated by a corresponding gain in domestic production. The fact is obvious that competing materials have been undermining the use of prussiates. Imports of yellow prussiate in 1923 are shown below, the returns for December not yet having been received:

Imports of Yellow Prussiate of Potash

	Lb.	Value
January	128,855	$40,733
February	.....	.....
March	22,046	2,350
Aoril	.....	.....
May	35,895	7,870
June	5,762	1,794
July	.....	.....
August	37,617	6,638
September	46,619	8,197
October	74,477	11,902
November	40,306	8,604
Total	391,577	$88,088

Market prices per lb. for yellow prussiate of potash for the past 6 years were:

	High	Low		High	Low
1923	$0.39	$0.21½	1920	$0.38	$0.33
1922	.41	.22	1919	.80	.24
1921	.26	.18	1918	1.25	.75

Larger Lime Production in 1923

Domestic production of lime was materially larger in 1923 than in the preceding year. The larger output came as a result of increased demand for chemical lime and building lime. Agricultural lime did not share in the increase of production and a very poor year for the latter is reported, with a probable decline in output. Total lime production for the year was approximately 4,100,000 short tons, valued at $39,000,000. This represents an increase of 12.5 per cent in quantity and 17.5 per cent in value as compared with totals for 1922.

Large Output of Bauxite

About 500,000 long tons of bauxite was produced in the United States in 1923, according to estimates of the Geological Survey. This quantity is equal to the largest domestic production before the World War.

The imports of bauxite, most of it from South America but some from France and Dalmatia, amounted to 8,500 tons a month, indicating a total for the year of 102,000 tons, as compared with 23,656 tons in 1922. All the bauxite received from South America came entirely from British Guiana, where the Demerara Bauxite Co. reopened its mines and completed its drying and loading equipment at Mackenzie, on Demerara River, 60 miles above Georgetown. This bauxite, which is said to be of excellent grade, was used by manufacturers of aluminum and aluminum salts. It can probably be landed and sold at Eastern markets cheaper than domestic bauxite, even after the import duty of $1 a ton has been paid, and its importation will seriously affect the business of some domestic bauxite miners. A large drying and loading plant was erected on Cottica River 100 miles above Paramaribo, Dutch Guiana, from which bauxite will be exported during 1924.

Domestic bauxite was quoted at $6 to $9 a ton until June, 1923, but afterward the quotations on all grades dropped 50c. a ton. Foreign bauxite was quoted $1 lower than domestic until the price was reduced, when the difference was only 25c. a ton.

Coke Byproducts Reach Record Output in 1923

In 1923 the production of byproduct coke in the United States established a record for all time. The output of coke byproducts was, therefore, also a record for the industry. As a consequence chemical industry has had an abundance of raw material in the form of tar, crude light oils, ammonium sulphate and byproduct gas.

The following tabulation shows by months the U. S. Geological Survey reports of production of byproduct coke in the United States during 1923:

	Net Tons
January	3,100,000
February	2,810,000
March	3,256,000
April	3,206,000
May	3,328,000
June	3,166,000
July	3,267,000
August	3,239,000
September	3,113,000
October	3,101,000
November	2,942,000
December	2,999,000
	37,527,000

From these coke production data, the output of byproducts can be estimated with fair accuracy by assuming that the ratio of byproducts to coke was the same as in the preceding year. In 1922, the output of these byproducts per net ton of coke produced was as follows:

Tar	11.5 gal.
Ammonium sulphate or equivalent	31.5 lb.
Gas	15.5 M. cu.ft.
Crude light oils	3.6 gal.

On this basis the 1923 production of byproducts is estimated as follows:

Tar	430,000,000 gal.
Ammonium sulphate or equivalent	590,000 net tons
Byproduct gas	580,000,000 M. cu.ft.
Crude light oils	135,000,000 gal.

Chemical and Material Markets in 1923

Menhaden Oil

Fishing operations along the Atlantic coast were stimulated by the high prices which obtained for crude oil. Soap makers and oil hardeners were active buyers, and it was reported that these interests consumed more than one-half of the output. Production of crude oil was placed at 150,000 bbl., which compares with 123,000 bbl. in 1922 and 129,000 bbl. in 1921. The monthly range of prices in 1923 for crude oil, per gal., in tank cars, f.o.b. fish factory, follows:

	High	Low		High	Low
Jan.	$0.50	$0.48	July	$0.45	$0.42
Feb.	.52	.52	Aug.	.40	.38
Mar.	.52	.52	Sept.	.47	.42
Apr.	.52	.50	Oct.	.47	.47
May	.50	.50	Nov.	.47	.47
June	.50	.48	Dec.	.47	.47

Linseed Oil

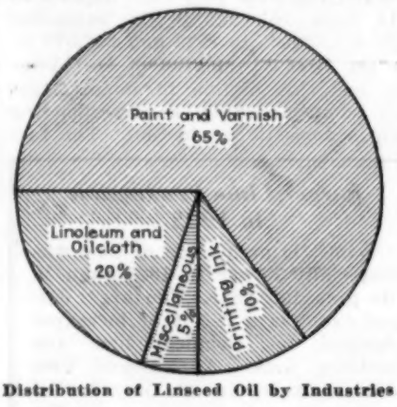
Consumption of linseed oil in the United States reached the total of 90,000,000 gal. during the calendar year, against 85,000,000 gal. in 1922. In other words, the industry produced more oil than ever before. The immediate cause for the tremendous volume of business was the activity in the paint and varnish field. Demand for linseed oil in the linoleum and oilcloth industries also showed gains, while a normal quantity of material went into the other lines of trade, such as printing inks, leather and soap. It is estimated that the paint and varnish industries consumed 65 per cent of the output.

The tariff was instrumental in restricting the movement of foreign oil into the United States, the importations for the year amounting to 5,600,000 gal., which compares with 22,500,000 gal. in 1922.

World production and consumption of flaxseed governs price tendencies in the market for linseed oil. Owing to the disrupted state of industry throughout Europe, consumption abroad has not been up to normal and it has been a matter of much speculation among traders to forecast world requirements. The needs of the United States increased to such an extent, however, that a shrinkage in the purchasing power of Continental Europe did not produce a really disastrous effect in the market. Prices which obtained for seed were high enough to warrant heavy plantings in the leading seed-producing countries and the headway made in this direction in the Argentine was truly astonishing. In 1923 the Argentine produced 51,000,000 bu. of flaxseed, which was a record quantity and more than offset the shortage in production in the United States crop, not to mention Canada and Russia. The output in India in 1923 was larger than in 1922.

High and low prices by months in the New York market for 1923 and 1922, covering carload lots, per gal., cooperage included, follow:

	1923 High	1923 Low	1922 High	1922 Low
January	$0.88	$0.86	$0.68	$0.60
February	.96	.90	.84	.68
March	1.05	.98	.84	.82
April	1.17	1.12	.80	.78
May	1.17	1.14	.88	.86
June	1.12	1.08	.86	.82
July	1.08	1.00	.88	.84
August	.98	.91	.86	.85
September	.88	.88	.88	.86
October	.94	.90	.90	.86
November	.92	.89	.86	.84
December	.91	.90	.88	.86



Distribution of Linseed Oil by Industries

Production of flaxseed in the four leading producing countries, in bu., for the past 5 years, follows:

Argentina		India	
1923	*51,000,000	1923	21,280,000
1922	36,046,000	1922	17,360,000
1921	50,470,000	1921	10,800,000
1920	42,038,000	1920	16,760,000
1919	30,775,000	1919	9,400,000

Canada		United States	
1923	*6,942,000	1923	17,429,000
1922	5,009,000	1922	10,375,000
1921	4,112,000	1921	8,029,000
1920	7,998,000	1920	10,774,000
1919	5,473,000	1919	7,256,000

* Latest estimates.

Importations of linseed oil into this country by months, with a comparison (figures given are in lb.) follow:

	1923	1922
January	106	11,574,410
February	64	10,529,640
March	189,245	3,143,109
April	4,525,353	21,484,958
May	11,357,300	27,871,568
June	10,156,768	18,568,148
July	10,862,997	8,014,440
August	4,816,354	12,673,500
September	628,102	6,260,753
October	413,213	3,331,862
November	47,401	196,536
December	.....	57,801
Total	*42,996,903	144,136,792

*11 months.

Importations of flaxseed for the 11 months ended Nov. 30, 1923, and the 12 months of 1922 (in bu.), follow:

	1923	1922
January	1,643,167	1,034,125
February	1,901,821	1,112,621
March	2,431,340	1,048,851
April	3,108,704	473,161
May	4,419,010	1,432,014
June	3,213,761	1,536,510
July	2,298,672	1,654,257
August	1,699,885	1,101,359
September	818,485	1,436,076
October	788,408	1,041,018
November	922,987	1,428,322
December	.....	1,614,847
Totals	*23,258,494	14,913,161

*11 months.

Argentine flaxseed shipments for the 12 months ended Dec. 31 for the past 2 years, by countries (in bu.), follow:

	1923	1922
United Kingdom	3,540,000	3,055,000
Continent	13,904,000	16,291,000
United States	20,880,000	12,696,000
To order*	5,284,000	5,074,000
Totals	43,608,000	37,116,000

* Most of the to order shipments were absorbed by the United Kingdom.

Cottonseed Oil

The 1922-3 season witnessed a higher trading basis for cottonseed oil. Production of lint from the 1922 crop was officially estimated at 9,761,817 bales, comparing with 7,953,641 bales in 1921. The larger yield, compared with "normal" crop years, indicated a serious shortage in the supply of seed, and, with cheap Oriental oils not a factor because of the tariff, the supply of cottonseed oil was barely sufficient for our requirements.

Despite the higher prices, actual distribution increased. As in previous years, the bulk of the output of oil was consumed by the lard compound trade, estimates on distribution in this one quarter ranging from 60@70 per cent. There was a larger call for salad oil, while technical lines of industry took on less of the cottonseed product.

High prices restricted export business, but this market factor had no serious influence on the industry, as the short supply of oil did not provide for an exportable surplus.

Cottonseed products produced during the 1922-3 season, compared with the preceding crop year, follow:

	Season 1922–3	Season 1921–2
Crude oil, lb.	1,003,025,212	930,474,738
Refined oil, lb.	*910,539,168	839,898,417
Cake and meal, tons	1,486,861	1,354,604
Hulls, tons	943,595	936,990

* Produced from 984,378,630 lb. of crude oil.

Stocks of cottonseed products on hand July 31, the closing of the crop year, with a comparison, follow:

	July 31, 1923	July 31, 1922
Crude oil, lb.	5,036,294	6,905,409
Refined oil, lb.	137,997,813	163,851,360
Cake and meal, tons	50,173	66,915
Hulls, tons	15,963	28,617

Exports of cottonseed products for 12 months ended July 31, 1923, and a year ago:

	1923	1922
Crude and refined oil, lb.	64,469,273	85,992,501
Cake and meal, tons	226,584	252,925

Production of cottonseed as estimated by the Department of Agriculture, and crop year receipts of cottonseed at mills, in tons, follows:

	Est. Prod.	Receipts at Mills
1923	4,476,000	.....
1922	4,336,000	3,244,960
1921	3,531,000	2,923,658

Consumption of refined cottonseed

Chemical and Material Markets in 1923

oil by months (in bbl.) for the past two seasons, according to an analysis of the Bureau of Census statistics issued monthly:

	1922-3	1921-2
August	168,000	259,000
September	233,500	283,500
October	298,500	233,500
November	273,500	173,500
December	194,000	129,000
January	233,000	192,000
February	194,000	208,500
March	167,000	204,000
April	151,000	109,500
May	128,500	179,500
June	141,000	152,000
July	163,000	136,000
Total	2,345,000	2,260,000

Cottonseed oil crude (cents per lb.), f.o.b. mills, tank cars, immediate shipment:

	1923 High	1923 Low	1922 High	1922 Low
January	$0.09¼	—$0.09¼	$0.07¼	—$0.07
February	.10	— .09¾	.08¾	— .07¾
March	.10¼	— .10¼	.10¼	— .10
April	.10¼	— .10	.10	— .09¾
May	.10	— .09¾	.10	— .09¾
June	.10	— .09¼	.08¾	— .08¾
July	.09¼	— .08¾	.08¾	— .08¼
August	.08¾	— .07¾	.08¼	— .08
September	.10¼	— .09	.06¾	— .06¾
October	.10¼	— .08¾	.07¼	— .06¾
November	.10	— .09¼	.08¼	— .08
December	.09¼	— .09¼ —	.09	— .08¼

Tallow

Reflecting increased business in soaps, trading in tallow was active and prices obtained were considerably higher than in 1922. The tariff on imported material naturally had a strengthening influence on the domestic product. High and low prices for extra city tallow, loose, ex-plant, per lb., by months for the past 2 years, follow:

	1923 High	1923 Low	1922 High	1922 Low
January	$0.09	$0.08¾	$0.06¾	$0.06¼
February	.09	.08¾	.06¾	.06¼
March	.09¼	.08¾	.07¼	.06¼
April	.09	.08¾	.06¼	.06¼
May	.08¾	.07¾	.07	.06¼
June	.07¾	.06¾	.06¾	.06¼
July	.06¾	.06¾	.06¾	.06¼
August	.07	.06¾	.06¾	.06¼
September	.08	.07¼	.07	.06¾
October	.07¾	.07¼	.07	.07
November	.07¾	.07¼	.08	.07¼
December	.08	.07¾	.08¾	.07¾

Coconut Oil

Importations of coconut oil in 1923 were smaller than in the preceding year, but as these were offset by larger importations of copra, actual consumption of coconut oil in the United States increased. The soap industry consumed the bulk of the oil traded in. Progress in the sale of edible products made from the oil, such as nut butter and lard substitutes, was slow and disappointing.

Prices moved within narrow limits, the range for the year in the New York market being 8@9¼c. per lb., tank-car basis, for Ceylon type oil. Notwithstanding the strength in competing oils, the speculative element did not enter into the market for coconut oil on so large a scale as in 1922. The Pacific coast market again was the scene of most of the trading. January, 1923, witnessing tank-car business at 8c. per lb. and c.i.f. transactions at 7¾c. per lb. The flurry in March and April resulted in business at 9c. per lb., coast shipping centers. The close of the year found the Pacific coast market steady at 8¼@8¾c. per lb., tank-car basis, all positions.

Ceylon type coconut oil in the New York market in sellers' tank cars, immediate delivery, cents per lb.:

	1923 High	1923 Low		1923 High	1923 Low
an.	$0.08¼	—$0.08¾	July	$0.08¼	—$0.08
Feb.	.08¼	— .08¼	Aug.	.08¼	— .08
Mar.	.09¼	— .08¾	Sept.	.08¼	— .08¼
Apr.	.09¼	— .09	Oct.	.08¼	— .08¼
May	.09	— .08¾	Nov.	.08¼	— .08¼
June	.08¼	— .08¼	Dec.	.08¼	— .08¼

Importations of coconut oil by months, with a comparison, the figures given being in lb., follow:

	1923	1922
January	29,900,047	22,525,545
February	22,972,423	24,100,913
March	6,876,737	32,998,606
April	14,367,641	18,511,927
May	19,510,026	16,360,890
June	18,378,646	12,254,318
July	3,478,483	13,443,405
August	10,818,574	11,460,150
September	5,669,469	6,923,002
October	11,990,365	22,986,909
November	10,874,536	21,103,713
December	.....	18,494,540
Totals	*157,781,981	221,163,918

* 11 months.

Receipts of copra increased in 1923, the monthly figures, in lb., with a comparison, being as follows:

	1923	1922
January	34,988,921	32,870,316
February	28,867,316	22,193,933
March	17,368,878	20,467,787
April	26,139,236	23,055,100
May	19,304,141	22,804,300
June	38,016,227	12,717,189
July	32,727,238	27,224,816
August	16,622,910	10,184,333
September	19,069,967	6,271,840
October	40,777,104	27,863,767
November	37,252,906	7,156,186
December	.....	39,880,290
Totals	*315,046,085	252,697,857

* 11 months.

China Wood Oil

There was a shortage in supplies of wood oil, but this was brought about by the heavy demand for varnishes made with this material. Shipments from China were heavy, and official statistics show that more oil arrived at United States ports than ever before in the history of the industry.

Demand for china wood oil varnishes by the automobile industry was enormous, and this accounted for the fact that oil sold readily at abnormally high prices. Plans to develop home production of china wood oil were formulated. It is hoped that the tung tree can be grown successfully in Florida. China wood oil is now regarded as a necessity and not as a commodity competing with linseed oil.

The sensational advance in prices that took place in April was due in part to covering by speculative shorts, but most of the speculative activity took place in the Oriental markets.

High and low prices, by months, obtaining in the New York market for the past 2 years, per lb., follow:

	1923		1922	
January	$0.15	—$0.14¾	$0.13¼	—$0.13
February	.19	— .18	.14¼	— .13¼
March	.32	— .19	.14¼	— .14
April	.40	— .32	.14	— .13¾
May	.38	— .26¼	.13¾	— .13¼
June	.26	— .25¾	.13¾	— .13¾
July	.25¼	— .23	.12¾	— .11¾
August	.23¼	— .22¼	.12¾	— .12¼
September	.22¼	— .22	.12¾	— .12
October	.21¼	— .20¼	.12¾	— .12¼
November	.21	— .20	.12¾	— .12¾
December	.21	— .21	.14¼	— .12¾

Importations of china wood oil, in gal. by months, with a comparison, follow:

	1923	1922
January	752,142	628,762
February	815,897	423,229
March	785,784	693,216
April	852,813	1,259,340
May	1,148,995	778,767
June	1,512,800	713,098
July	1,236,450	1,610,868
August	1,757,645	1,088,956
September	899,404	820,990
October	726,413	1,357,957
November	620,546	1,033,516
December	.....	417,241
Totals	*11,086,313	10,825,949

* 11 months.

Palm Oil

Because of the high market for tallow, soap makers made heavy purchases of palm oil. The importations were of record proportions, being in excess of double the quantity received in 1922. Soap makers found that this oil could be utilized in the manufacture of practically all kinds of soap, especially with the price not much higher than ordinary grease. The oil imported was shipped in most part direct from Africa, full cargo consignments coming forward at regular intervals. The bulk of the importations consisted of hard oils, Niger predominating. The tin plate trade took on usual quantities of Lagos oil. According to importers rubber manufacturers were buyers of the lower grades of palm oil on a larger scale than ever before.

Prices, by months, on Lagos and Niger oil, in the New York market, per lb., follow:

	1923 Lagos High	1923 Lagos Low	1923 Niger High	1923 Niger Low
January	$0.08	—$0.08	$0.07¾	—$0.07¾
February	.08¼	— .08	.07¾	— .07¾
March	.08¼	— .08¼	.08¼	— .07¾
April	.08¼	— .08¼	.08¼	— .08
May	.08¼	— .07¾	.07¾	— .07
June	.07¼	— .07	.07	— .06¾
July	.07	— .06¾	.06¾	— .06¾
August	.07	— .06¾	.06¾	— .06¾
September	.07¼	— .07¼	.07¼	— .06¾
October	.07¼	— .07¼	.07¼	— .07
November	.07¾	— .07¾	.07¾	— .06¾
December	.07¼	— .07¼	.06¼	— .06¾

Importations of palm oil by months for the past 2 years (in lb.) follow:

	1923	1922
January	13,993,954	4,259,355
February	14,034,809	5,354,645
March	15,638,747	8,373,791
April	17,988,244	4,018,304
May	11,891,194	2,649,080
June	15,797,424	3,428,930
July	11,827,252	3,245,769
August	2,482,884	5,182,728
September	2,045,782	665,189
October	5,139,923	4,840,441
November	7,457,196	4,275,197
December	.....	10,772,650
Totals	*118,336,205	57,516,079

* 11 months.

Comparative Prices in the New York Market, 1923

The following prices refer to round lots in the New York market. Where it is the trade custom to sell f.o.b. producing points, the quotations are given on that basis and are so designated. The figures show the opening price, the high, the low and the closing price for 1923.

General Chemicals

		Jan. 1	High	Low	Dec. 31
Acetone, drums	lb.	$0.21	$0.25	$0.21	$0.25
Acid, acetic, 28%, bbl.	100 lb.	3.13	3.38	3.13	3.38
Boric, bbl.	lb.	.11	.11	.10	.10
Citric, dom., kegs	lb.	.50	.52	.48	.48
Citric, imp., kegs	lb.	.49½	.52	.46	.46
Lactic, 44%, tech., light, bbl.	lb.	.11	.11½	.11	.11½
22% tech., light, bbl.	lb.	.05	.05½	.05	.05½
Muriatic, 18° tanks	100 lb.	.80	.90	.80	.90
Nitric, 36°, carboys	lb.	5.00	5.00	4.50	4.50
Oxalic, crystals, bbl.	lb.	.13½	.14	.11½	.12
Sulphuric, 60°, tanks	ton	12.00	12.00	9.00	9.00
Tartaric, imp., powd., bbl.	lb.	.31	.36½	.26	.26½
Tartaric, domestic, bbl.	lb.	.31	.38	.30	.30
Alcohol Ethyl, 190 p'f. U.S.P., bbl.	gal.	4.74	4.80	4.74	4.80
Alcohol, denatured, 190 proof					
No. 1 special dr.	gal.	.39	.51½	.38½	.51½
No. 5, 188 proof, dr.	gal.	.38	.50½	.37½	.50½
Alum, ammonia, lump, bbl.	lb.	.03½	.03½	.03½	.03½
Potash, lump, bbl.	lb.	.03½	.03½	.02½	.02½
Aluminum sulphate, com., bags	100 lb.	1.50	1.50	1.40	1.40
Aqua ammonia, 26°, drums	lb.	.07½	.07½	.07	.07
Ammonia, anhydrous, cyl.	lb.	.30	.30	.30	.30
Ammonium carbonate, powd. tech., casks	lb.	.09½	.09½	.09	.09
Ammonium nitrate, tech., casks	lb.	.06½	.10	.06½	.08½
Amyl acetate tech., drums	gal.	2.35	4.50	2.35	4.25
Arsenic, white, powd., bbl.	lb.	.15½	.16½	.08½	.13½
Arsenic, red, powd., kegs	lb.	.12½	.16	.12½	.15
Barium carbonate, bbl.	ton	75.00	75.00	65.00	68.00
Barium chloride, bbl.	ton	95.00	95.00	78.00	80.00
Barium nitrate, casks	lb.	.08½	.08½	.07½	.08
Bleaching powder, f.o.b. wks., drums	100 lb.	2.25	2.25	1.25	1.25
Borax, bbl.	lb.	.05½	.05½	.05½	.05½
Calcium acetate, bags	100 lb.	3.50	4.00	3.50	4.00
Calcium arsenate, dr.	lb.	.20	.20	.11	.12½
Calcium carbide drums	lb.	.05½	.05½	.05	.05
Calcium chloride, fused, dr. wks.	ton	21.00	21.00	21.00	21.00
Carbon bisulphide, drums	lb.	.07	.07	.06½	.06½
Carbon tetrachloride drums	lb.	.10	.10	.09	.09
Chlorine, liquid, tanks, wks.	lb.	.05	.05	.03	.03
Cobalt, oxide, bbl.	lb.	2.10	2.10	2.10	2.10
Copperas, bulk, f.o.b. wks.	ton	21.00	25.00	19.00	25.00
Copper carbonate, bbl.	lb.	.20	.20	.16½	.16½
Copper sulphate, dom., bbl.	100 lb.	.06	.06½	.04½	.04½
Imp. bbl.	100 lb.	.06	.06	.04½	.04½
Cream of tartar, bbl.	lb.	.25	.26½	.22	.22½
Epsom salt, dom., tech., bbl.	100 lb.	1.85	2.00	1.80	1.90
Epsom salt, imp., tech., bags	100 lb.	1.20	1.20	.90	1.00
Ethyl acetate, 85%, drums	gal.	.82	1.07	.80	1.07
Formaldehyde, 40%, bbl.	lb.	.16	.16½	.10½	.10½
Fusel oil, crude, drums	gal.	2.00	5.00	2.00	4.00
Glaubers salt, bags	100 lb.	1.00	1.25	.80	.90
Glycerine, c.p., drums, extra	lb.	.18½	.18½	.16	.16½
Lead:					
White, basic carbonate, dry, casks	lb.	.08½	.09½	.08½	.09½
White, basic sulphate, casks	lb.	.08½	.09½	.08½	.08½
Lead acetate, white crys., bbl.	lb.	.12	.14	.12	.14
Lead arsenate, powd., bbl.	lb.	.21	.22½	.18	.18
Lithopone, bags	lb.	.06½	.07	.06½	.06½
Magnesium carb., tech., bags	lb.	.07½	.08½	.07½	.08
Methanol, 95%, bbl.	gal.	1.13	1.23	.93	.93
Methanol, 97%, bbl.	gal.	1.15	1.25	.95	.95
Nickel salt, double, bbl.	lb.	.11	.11	.10	.10
Nickel salts, single, bbl.	lb.	.12	.12	.11	.11
Phosphorus, red, cases	lb.	.50	.75	.50	.70
Phosphorus, yellow, cases	lb.	.35	.40	.35	.35
Potassium bichromate, casks	lb.	.09½	.10½	.09½	.09½
Potassium carbonate, 80-85%, calcined, casks	lb.	.05½	.07	.05½	.05½
Potassium chlorate, powd.	lb.	.07½	.07½	.07	.07½
Potassium hydroxide (caustic potash) drums	lb.	.06½	.08½	.06½	.06½
Potassium nitrate, bbl.	lb.	.06½	.06½	.06½	.06½
Potassium permanganate, drums	lb.	.15½	.26	.14	.14
Potassium prussiate, red, casks	lb.	.85	.85	.42	.44
Potassium prussiate, yellow, casks	lb.	.38	.39	.22	.22
Salammoniac, white, gran., casks	lb.	.06½	.07	.05½	.06½
Salsoda, bbl.	100 lb.	1.10	1.10	1.10	1.10
Soda ash, light, 58%, bags, contract	100 lb.	1.75	1.75	1.38	1.38
Soda, caustic, 76%, solid, drums contract	100 lb.	3.75	3.75	3.10	3.10
Sodium acetate, works, bbl.	lb.	.07½	.07½	.05	.05
Sodium bicarbonate, 330-lb. bbl.	100 lb.	1.75	2.00	1.75	1.75
Sodium bichromate, casks	lb.	.07½	.08½	.07½	.07½
Sodium chlorate, kegs	lb.	.06½	.07	.06½	.06½
Sodium cyanide, cases, dom.	lb.	.22½	.23	.22	.22
Sodium cyanide, imp. cases	lb.	.20	.21½	.18	.19
Sodium fluoride, bbl.	lb.	.09½	.09½	.08½	.08½
Sodium nitrite, casks	lb.	.08	.09	.07½	.08
Sodium phosphate, dibasic, bbl.	lb.	.03½	.03½	.03½	.03½
Sodium prussiate, yel. drums	lb.	.18½	.19	.10	.11½
Sodium silicate (40°, drums)	100 lb.	1.25	1.25	.75	.75
Sodium sulphide, fused, 60-62% drums	100 lb.	4.00	4.00	3.10	3.10
Sodium sulphite, crys., bbl.	lb.	.03½	.03½	.03½	.03½
Strontium nitrate, powd., bbl.	lb.	.09½	.12½	.09½	.11
Sulphur, crude at mine, bulk	ton	14.00	16.00	14.00	16.00
Sulphur, flour, bag	100 lb.	2.35	2.35	2.35	2.35
Tin bichloride, bbl.	lb.	.12	.13½	.11½	.12½
Tin oxide, bbl.	lb.	.45	.55	.45	.51
Tin crystals, bbl.	lb.	.31½	.37	.29½	.34½
Zinc chloride, gran, bbl.	lb.	.06	.06½	.06	.06½
Zinc oxide, lead free, bag	lb.	.07½	.07½	.06½	.06½
5% lead sulphate, bags	lb.	.06½	.06½	.06½	.06½
Zinc sulphate, bbl.	100 lb.	2.75	2.75	2.75	2.75

Coal-Tar Products

		Jan. 1	High	Low	Dec. 31
Alpha-naphthol, crude, bbl.	lb.	$0.95	$0.95	$0.60	$0.60
Alpha-naphthol, ref., bbl.	lb.	1.05	1.05	.65	.65
Alpha-naphthylamine, bbl.	lb.	.28	.37	.28	.35
Aniline oil, drums	lb.	.16½	.17	.16	.16
Aniline salts, bbl.	lb.	.24	.24	.22	.22
Anthracene, 80%, drums	lb.	.75	.75	.75	.75
Anthracquinone, 25%, drums	lb.	.70	.80	.70	.75
Benzaldehyde U.S.P., carboys	lb.	1.35	1.50	1.35	1.50
Benzene, 90%, tanks, works	gal.	.37	.37	.21	.21
Benzidine base, bbl.	lb.	.85	.85	.80	.82
Benzoic acid, U.S.P., kegs	lb.	.70	.85	.70	.85
Benzoate of soda, U. S. P., bbl.	lb.	.57	.65	.57	.65
Benzyl chloride, tech., drums	lb.	.20	.30	.20	.25
Beta-naphthol, tech., bbl.	lb.	.25	.27	.21	.24
Beta-naphthylamine, tech.	lb.	1.00	1.00	.72	.75
Cresol, U.S.P., drums	lb.	.25	.25	.25	.25
Cresylic acid, 97%, works drums	gal.	.65	1.75	.65	.75
95-97%, drums, works	gal.	.55	1.70	.55	.70
Dichlorbenzene, drums	lb.	.07	.07	.06	.06
Dimethylaniline, drums	lb.	.50	.50	.49	.49
Dinethylaniline, drums	lb.	.39	.41	.39	.39
Dinitrophenol, bbl.	lb.	.34	.35	.34	.35
Dinitrotoluen, bbl.	lb.	.22	.22	.18	.20
Diphenylamine, bbl.	lb.	.54	.54	.48	.50
H-acid, bbl.	lb.	.75	.85	.70	.75
Monochlorbenzene, drums	lb.	.08	.10	.08	.08
Monoethylaniline, drums	lb.	.95	.95	.95	.95
Naphthalene, flake, bbl.	lb.	.06	.09½	.06	.06
Naphthalene, balls, bbl.	lb.	.06½	.10½	.06½	.06½
Naphthionate of soda, bbl.	lb.	.58	.62	.58	.60
Naphthionic acid, crude, bbl.	lb.	.60	.60	.55	.55
Nitrobenzene, drums	lb.	.10	.10	.09½	.09½
N-W acid, bbl.	lb.	1.20	1.25	1.10	1.10
Ortho-amidophenol, kegs	lb.	2.25	2.80	2.25	2.30
Ortho-dichlorbenzene, drums	lb.	.17	.17	.15	.15
Ortho-nitrophenol, bbl.	lb.	.85	1.35	.85	1.20
Ortho-nitrotoluene, drums	lb.	.12	.11	.08	.10
Ortho-toluidine, bbl.	lb.	.14	.18	.13	.14
Para-amifophenol, base, kegs	lb.	1.15	1.40	1.15	1.30
Para-dichlorbenzene, bbl.	lb.	.17	.17	.17	.17
Paranitroaniline, bbl.	lb.	.75	.75	.70	.70
Para-nitrotoluene, bbl.	lb.	.55	.60	.52	.60
Para-phenylenediamine, bbl.	lb.	1.50	1.50	1.40	1.45
Para-toluidine, bbl.	lb.	.85	.95	.82	.90
Phthalic anhydride, bbl.	lb.	.40	.45	.30	.30
Phenol, U.S.P., dr.	lb.	.34	.55	.25	.26
Picric acid, bbl.	lb.	.20	.20	.20	.20
Resorcinol, tech., kegs	lb.	1.50	1.60	1.40	1.40
R-salt, bbl.	lb.	.55	.60	.55	.55
Salicylic acid, tech., bbl.	lb.	.35	.47	.30	.32
Salicylic acid, U.S.P., bbl.	lb.	.40	.52	.35	.35
Solvent naphtha, crude, tanks	gal.	.22	.27	.20	.20
Sulphanilic acid, crude, bbl.	lb.	.20	.20	.17	.18
Toluidine, mixed, kegs	lb.	.30	.35	.30	.30
Toluene, tank cars, works	gal.	.35	.35	.24	.24
Xylidine drums	lb.	.40	.50	.40	.50
Xylene, pure, drums	gal.	.45	.75	.42	.45
Xylene, com., tanks	gal.	.30	.35	.27	.28

Oils and Fats

Castor oil, No. 3, bbl.	lb.	.11½	.14	.11½	.14
Chinawood oil, bbl.	lb.	.14½	.40	.14½	.21
Coconut oil, Ceylon, tanks, N. Y.	lb.	.08½	.09½	.08	.08½
Corn oil, Crude, tanks, (f.o.b. mill)	lb.	.09½	.10½	.08½	.09½
Cottonseed oil, crude (f.o.b. mill), tanks	lb.	.09½	.10½	.08½	.09½
Linseed oil, raw, car lots, bbl.	gal.	.87	1.15	.87	.90½
Palm, Lagos, casks	lb.	.08	.08½	.06½	.07½
Niger, casks	lb.	.07½	.08½	.06½	.06
Peanut oil, crude, tanks (mill)	lb.	.12½	.12½	.10½	.12
Rapeseed oil, refined, bbl.	gal.	.83	.83	.72	.76½
Sesame, bbl.	lb.	.15	.15	.11½	.12½
Soya bean tank, (f.o.b. N. Y.)	lb.	.10	.11	.08½	.10½
Sulphur (foots), bbl.	lb.	.08½	.09½	.07½	.09
Cod, Newfoundland, bbl.	gal.	.60	.68	.58	.68
Menhaden, light pressed, bbl.	gal.	.58	.65	.52	.65½
Crude, tanks (f.o.b. factory)	gal.	.48	.52	.38	.47½
Grease, yellow, loose	lb.	.07½	.08	.06½	.06½
Oleo Stearine	lb.	.10	.12½	.10	.10
Red oil, distilled, d.p. bbl.	lb.	.10	.10½	.08½	.08½
Tallow, extra, loose	lb.	.08¾	.09½	.06½	.08

Miscellaneous

Ammonium sulphate, bulk f.o.b. works	100 lb.	$3.20	$3.40	$3.70	$3.75
Nitrate of soda, bags	100 lb.	2.57½	2.65	2.40	2.50
Paraffine, crude, scale 124-126 m.p. bags	lb.	.02½	.03½	.02½	.03¼
Potassium muriate, 80%, bags	ton	35.55	35.55	34.55	34.55
Rosin B-D, bbl.	280 lb.	6.10	6.20	5.60	5.60
Turpentine, spirits of bbl.	gal.	1.45	1.60	.92½	.92½

Calcined Magnesite Production Tripled in 1923

The magnesite industry in California and Washington has been in good condition throughout 1923, according to the information given out by the Department of the Interior. The demand for caustic calcined magnesite, which was particularly active, was met by producers in both California and Washington. Dead-burned magnesite was supplied from mines in Washington and California, but this trade was not so good as it might have been, because of the large stocks of Austrian magnesite imported before Sept. 1, when the new tariff went into effect. In 1923 the domestic production of calcined magnesite, including dead-burned magnesite, will probably exceed 70,000 short tons, equivalent to 154,000 short tons of crude magnesite. This is practically three times as much as the production in 1922 and is nearly equal to the peak output before the war. The production was about equally distributed between California and Washington.

The imports of caustic calcined magnesite for the first 9 months of 1923 were 11,536 tons, of which about 55 per cent came from India and most of the remainder from Greece. During the same period 47,194 tons of dead-burned magnesite was imported, largely from Austria. This makes a total of 58,730 tons for the 9 months, as compared with 72,265 tons of calcined imported in 1922.

Domestic crude magnesite sold at about $14 a ton throughout the year, though in May and June prices were slightly lower. Calcined magnesite in lump was quoted at $32.50@$35 a ton during midsummer and $35@$37 in the fall, but $40 was asked during the early part of the year. Domestic caustic calcined magnesite—ground, put up in sacks, and guaranteed 90 per cent to pass 200-mesh screen—sold at $40@$45 a ton at Western producing points, whereas Grecian caustic sold at $50@$52 a ton at points on the Eastern seaboard. Domestic dead-burned magnesite was quoted at $32@$34 a ton at points in Washington, whereas quotations of similar material, apparently foreign, at points on the Eastern seaboard, were $40@$42 a ton.

Trend of Employment During 1923

Consumer Industries Show Less Variation Than Those That Make Materials

Because of the diversity of industries in New York State, the monthly employment statistics of this state have been commonly regarded as a fairly reliable index of factory employment throughout the country. Comparison of the New York figures with the Federal Reserve Board's employment index seems to substantiate fully this theory, as indicated by the diagrams herewith, which show an extraordinary degree of correlation in most of the industrial groups. Data for New York State are obtained from the State Department of Labor, while the index of the Federal Reserve Board is computed from material collected by various state bureaus and by the United States Department of Labor. The comparison presented here is that of the Federal Reserve Agent of the Second District prepared for his "Monthly Review of Credit and Business Conditions" for January, 1924.

In general the diagrams show also the tendency for employment to vary least in industries most directly related to the consumer, such as foods and food products, and to fluctuate most in industries that supply materials for further use in industry, such as chemicals and metal products. In the industries that supply the building industry employment throughout the country has risen above 1920 levels, but for all industries combined the number of workers has generally remained below 1920 notwithstanding the large increase in production since that time.

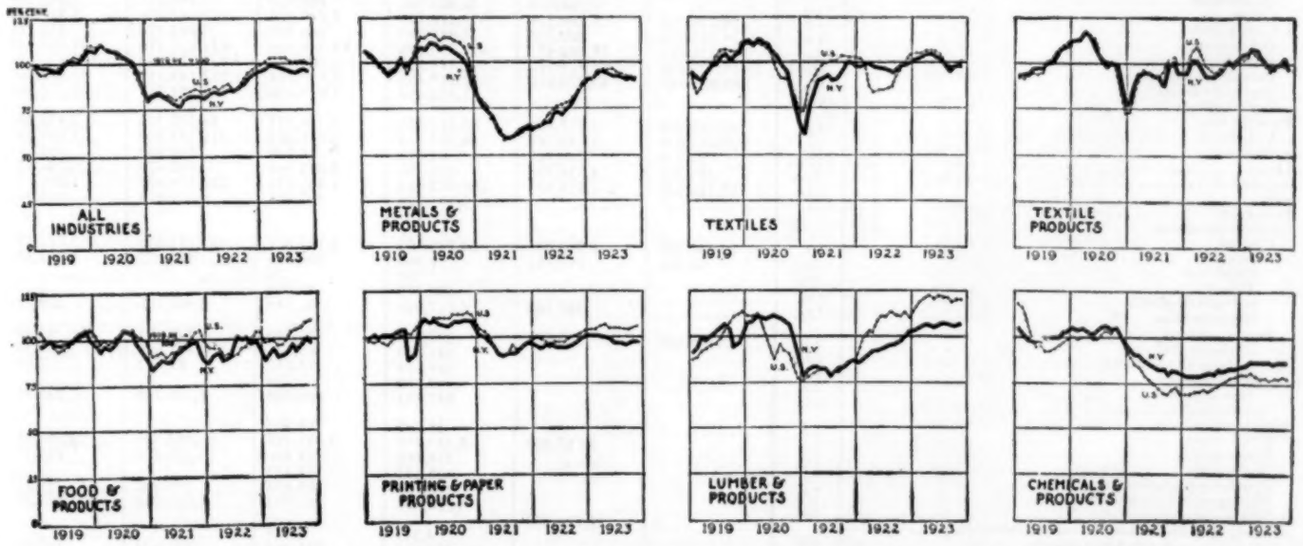
Increase in Canadian Paint and Varnish Trade

The output of the Canadian paint and varnish industry during the year just closed showed a fair increase over 1922, though prices were not such as to produce a corresponding increase in the value of the product. A fairly steady demand has prevailed in the domestic market and all signs point to a good turnover in 1924.

The raw material situation offered no special features, with the exception of china wood oil, the supply of which is a little uncertain. Otherwise there has been no difficulty in obtaining all needed materials of standard quality.

W. S. Fallis, vice-president and managing director of the Sherwin-Williams Co. of Canada, Ltd., Montreal, commenting on the situation, said: "Our operations have been carried on with a considerable increase in volume of output, equal to about 20 per cent over our volume for the previous year. The demand during the months of September, October and November was at least as good as for the same period in 1922, and we expect that from now on bookings will be freer and that the upward swing will be continued, not only in our own business but with respect to the situation in general."

H. E. Mihell, of the Imperial Varnish & Color Co., Ltd., Toronto, says: "We have experienced both a monetary increase and a considerable increase in the poundage production of our factory during the past year, as compared with the previous year. In general we can reasonably expect a larger demand for our product this year than last. Our export trade is confined to Mexico and compares favorably with last year."



Factory Employment in the United States and New York State by Industries. Indexes of Federal Reserve Board and of New York State Department of Labor (1919 = 100 Per Cent.)

Exports of Chemicals and Allied Products

		12 Months Ended December				11 Months Ended November	
		1921		1922		1923	
		Quantity	Value	Quantity	Value	Quantity	Value
Animal oils							
Oleo oil	Lb.	127,977,713	$14,617,971	109,386,571	$11,464,837	93,078,213	$11,039,604
Lard oil	Lb.	589,335	59,426	699,791	80,043	674,433	80,313
Neatsfoot oil	Lb.			1,147,511	175,875	1,019,754	175,121
Whale oil	Lb.			583,270	53,061	719,835	30,779
Other animal oils	Lb.	2,762,925	323,039	1,959,620	189,690	1,422,199	154,307
Fish oils							
Cod oil	Gal.			13,088	10,907	32,257	57,179
Cod-liver oil	Gal.			47,901	59,674		
Menhaden oil	Gal.			120,825	27,598		
Other fish oils	Gal.			505,561	167,473	714,561	75,096
Oleo stock	Lb.			15,596,285	1,523,464	9,565,082	1,078,799
Tallow, edible	Lb.			2,375,803	193,205	1,121,173	93,033
Tallow, inedible	Lb.			29,000,472	2,017,557	32,943,880	2,712,618
Lard	Lb.	868,941,569	112,532,841	766,950,103	91,484,669	936,803,603	116,547,198
Lard compounds	Lb.	48,206,583	5,548,931	16,286,169	1,952,187	6,905,198	934,497
Stearins and fatty acids	Lb.	32,696,424	3,264,280				
Oleo stearin	Lb.			9,988,127	975,168		
Lard stearin, edible	Lb.			689,929	74,524	8,342,701	894,429
Grease stearin	Lb.			3,406,737	277,215	3,130,768	295,269
Oleic acid or red oil	Lb.			3,590,298	290,482	1,370,692	116,653
Stearin and fatty acids	Lb.			5,036,253	480,838	2,605,127	339,390
Oleo margarine, animal	Lb.	3,329,049	672,327	1,843,407	298,48.	1,717,904	281,891
Other greases, oils and fats	Lb.		4,481,319	57,472,065	4,048,618	54,602,313	4,814,874
Glue, animal origin	Lb.	2,011,918	382,541	2,708,654	418,759	2,313,778	354,243
Beeswax	Lb.	97,765	29,632	100,674	27,699	80,553	27,626
Wax manufactures	Lb.		572,275	1,618,748	314,472	1,674,957	313,459
Oil cake and meal	Lb.	1,206,484,078	24,488,651	926,301,302	19,897,594	837,260,261	18,099,881
Soya-bean cake	Lb.			156,909	3,925		
Coconut cake	Lb.	9,219,583	106,439	7,960,197	106,057	1,577,940	35,328
Corn cake	Lb.	4,206,092	70,302	1,766,689	31,097	15,746	502
Cottonseed cake	Lb.	423,382,106	7,857,714	331,311,165	7,066,212	265,171,532	6,176,108
Linseed cake	Lb.	542,464,208	12,267,366	422,865,573	9,524,980	494,435,708	10,245,884
Peanut cake	Lb.			14,513,060	154,565	672,000	11,760
Other oil cake	Lb.	45,202,371	771,426	3,015,181	51,236	2,448,361	49,225
Cottonseed meal	Lb.	162,206,886	2,993,226	117,656,619	2,416,446	41,133,665	887,018
Linseed meal	Lb.	19,802,832	422,178	17,997,571	404,906	31,069,112	677,830
Other oil-meal	Lb.			9,058,338	138,170	736,197	16,226
Oilseeds, vegetable oils, etc.			27,778,835		14,302,337		
Oilseeds							
Cotton seed	Lb.	2,826,713	108,838	3,638,199	125,825		
Flaxseed	Bu.	347	1,745	2,372	8,012		
Other oilseeds	Lb.			65,221	6,753	1,873,800	93,934
Vegetable oils							
Coconut oil	Lb.	7,498,284	724,272	12,972,264	1,071,924	14,913,450	1,278,844
Cottonseed oil, crude	Lb.			31,712,143	2,508,696	22,079,932	2,074,501
Cottonseed oil refined	Lb.			43,590,678	4,778,446	20,400,878	2,461,796
Peanut oil	Lb.	1,708,335	183,433	963,102	100,691	202,931	18,578
Linseed oil	Lb.	3,512,228	406,460	2,702,634	332,781	2,845,169	385,959
Soya-bean oil	Lb.	1,943,768	176,753	2,458,080	207,288	874,659	91,480
Corn oil	Lb.	4,399,789	491,499	5,732,993	678,180	4,209,950	538,036
Cocoa butter	Lb.	2,855,278	755,544	1,199,869	359,782	688,704	196,346
Vegetable-oil margarine	Lb.			333,756	47,769	1,738,624	239,592
Vegetable oil soap stock	Lb.			25,478,494	2,968,705	3,401,613	236,686
Vegetable oil lard compound	Lb.			8,134,462	438,343	8,826,604	1,223,868
Other vegetable oils and fats	Lb.		568,317	6,369,664	669,142	7,834,743	893,621
Naval stores							
Rosin	Bbl.	1,001,542	5,201,963	1,427,097	7,488,348	1,097,745	10,148,782
Spirits of turpentine	Gal.	9,267,959	6,032,012	9,369,403	10,152,620	10,975,572	11,826,614
Tar, turpentine, pitch	Bbl.	27,481	215,278			790,155	340,560
Wood turpentine	Gal.			494,576	342,430	384,033	397,170
Tar and pitch, wood	Bbl.			36,345	159,173	64,621	331,021
Other gums and resins	Lb.			1,657,680	367,760	1,990,805	638,001
Dye Extracts							
Logwood extract	Lb.		589,756	2,626,103	448,713	1,832,917	245,595
Other dye extracts	Lb.		1,203,155	2,614,110	459,861	2,229,026	308,255
Tanning extracts							
Chestnut	Lb.			7,911,316	253,815	3,113,737	288,380
Quebracho	Lb.			1,179,477	60,803		
Other	Lb.		1,168,459	21,421,801	988,929	21,149,255	1,062,699
Cornstarch	Lb.	228,710,552	5,200,316	339,226,525	7,749,375	178,842,754	5,357,105
Other starch	Lb.	29,084,914	800,758	23,945,909	580,319	9,081,598	311,716
Petroleum, crude	Gal.	372,350,885	20,204,491	419,793,896	18,348,110	629,657,270	20,784,338
Petroleum, ref.	Gal.	2,416,425,754	363,475,512	2,502,871,738	312,563,476	2,953,572,390	300,657,586
Gas and fuel oil	Gal.	845,060,703	45,973,060	697,219,404	25,959,704	1,087,194,111	31,914,768
Lubricating oil	Gal.			1,832,653	1,014,436	315,381,766	69,551,380
Paraffin wax							
Unrefined	Lb.	46,189,485	1,527,804	83,516,978	2,419,223	84,287,206	2,452,480
Refined	Lb.	179,691,874	9,638,589	200,983,844	6,976,604	215,215,463	7,859,447
Lime	Bbl.	51,919	109,769	82,893	116,649	109,589	158,163
Sulphur	Ton	285,762	4,524,768	485,706	7,095,964	450,679	6,774,533
Salt	Lb.	219,126,247	1,415,471	269,977,554	1,429,172	228,596,673	1,096,170
Zinc dust	Lb.			3,995,124	287,890	6,651,813	448,394
Coal-tar products							
Crudes							
Benzol	Lb.	72,030,400	3,007,086	64,740,402	2,362,821	102,192,810	3,272,194
Crude tar	Bbl.	92,406	191,482	99,960	208,666	475,122	1,547,135
Toluol	Lb.			180	24		
Solvent naphtha	Gal			170,373	62,803		
Other crudes	Lb.		509,508	4,147,866	91,342	8,667,716	270,738
Intermediates							
Carbolic acid	Lb.	249,658	35,994	223,146	23,223	229,101	33,398
Aniline oil and salts	Lb.			341,820	65,636	487,680	90,513
Naphthalene	Lb.			109,514	12,657	67,852	7,917
Nitrobenzol	Lb.			42,980	5,296		
Other intermediates	Lb.			847,311	168,228	1,166,709	228,910
Finished products							
Color lakes	Lb.			28,228	19,928		
Other colors	Lb.		5,067,000	8,324,209	3,981,217	16,662,905	5,187,687
Medicinals	Lb.			554,166	224,546	225,491	153,508
Synthetic phenol resins	Lb.			128,153	13,183		
Photographic chemicals	Lb.			248,119	103,853	199,262	89,150
Other coal-tar products	Lb.			6,280,989	285,914	4,021,008	386,081
Medicinal and pharmaceutical preparations			12,724,430				
Morphine and other opium salts	Oz.			4,315	6,518		
Quinine sulphate and other cinchona salts	Oz.			357,613	219,964	386,627	163,084
Caffein	Lb.			103	338		
Cocaine	Oz.			686	4,231		
Strychnine	Oz.			5,772	5,654		
Antitoxins and serum	Oz.			674,921	399,617	10,178,227	380,210
Other medicinal preparations	Lb.			30,248,300	13,556,653	31,887,682	14,466,099

Exports of Chemicals and Allied Products—Continued

		12 Months Ended December				11 Months Ended November	
		1921		1922		1923	
		Quantity	Value	Quantity	Value	Quantity	Value
Acids and anhydrides							
Acetic	Lb.			5,080,519	$367,717	733,846	$89,575
Sulphuric	Lb.	12,814,344	$317,720	12,470,389	201,267	7,884,102	161,075
Nitric	Lb.	177,580	26,176	675,025	48,478		
Boric	Lb.			1,968,996	197,265	830,371	97,948
Lactic	Lb.			198,674	14,221		
Picric	Lb.	1,742	927				
All other	Lb.		1,171,992	9,518,087	626,057	9,786,925	602,500
Alcohols							
Wood and denatured	Gal.	412,110	454,584	1,270,314	922,700	1,126,488	1,186,555
Other alcohol	pf. Gal.	5,611,897	2,338,838	2,090,666	497,955	402,313	167,651
Ammonia and ammonium compounds	Lb.			7,247,480	990,111	4,800,981	862,844
Aluminum sulphate	Lb.			26,450,657	388,447	32,876,327	470,499
Baking powder	Lb.	3,888,875	1,493,202	3,428,395	1,515,775	3,844,199	1,633,838
Calcium compounds							
Acetate of lime	Lb.	18,239,740	404,528	27,596,106	591,599	29,603,620	752,999
Calcium carbide	Lb.	11,808,252	606,999	12,835,916	633,297	7,638,783	355,678
Bleaching powder	Lb.	18,447,579	483,752	41,069,188	679,775	27,373,042	499,435
Copper sulphate	Lb.	3,582,933	217,491	5,250,556	256,432	2,210,381	125,728
Dextrine or British gum	Lb.			16,239,474	536,027	14,379,877	553,219
Formaldehyde	Lb.		349,089	1,490,577	209,386	2,504,492	334,719
Glycerin	Lb.	2,394,714	361,507	2,870,463	425,891	1,681,820	304,849
Petroleum jelly	Lb.		1,358,273	7,264,256	1,254,239	8,011,881	1,071,265
Potash chlorate of	Lb.	375,401	49,709	562,986	51,066	183,728	19,750
Bichromate of	Lb.			4,430,208	433,552	3,041,861	275,937
Other	Lb.		286,284	7,483,175	296,378	4,495,231	182,085
Sodas and sodium compounds							
Cyanide	Lb.			1,250,566	235,298	4,989,696	470,318
Borax	Lb.	4,061,633	269,771	17,242,571	867,417	35,981,544	1,443,590
Soda Ash	Lb.	35,042,791	850,369	29,627,574	678,983	27,837,449	695,568
Silicate	Lb.	20,789,095	247,761	29,131,925	302,511	30,741,724	294,305
Sal soda	Lb.	10,354,513	204,616	11,463,418	186,284	11,187,161	164,066
Caustic	Lb.	49,865,219	2,041,236	146,739,406	5,271,528	105,051,801	3,523,560
Bicarbonate	Lb.	11,703,183	307,138	15,853,945	341,385	15,439,294	357,001
Other sodium compounds	Lb.		2,584,953	97,518,488	2,439,228	141,108,047	2,264,656
Thorium nitrate	Lb.			1,103	3,149		
Washing powder and fluid	Lb.	2,938,602	198,228	3,425,471	201,832	5,346,695	288,943
Zinc chloride	Lb.			268,503	16,873		
Other chemicals, except medicinal and pharmaceutical	Lb.		14,732,691	76,817,513	7,430,704	73,995,545	6,600,324
Pigments, paints and varnishes			12,132,850		11,477,863		15,395,293
Mineral with pigments, ocher, umber, sienna, metallic, whiting, etc	Lb.			27,631,228	981,905	26,400,226	927,360
Chemical pigments							
Zinc oxide	Lb.	5,021,509	426,253	7,953,847	593,128	9,509,719	697,657
Lithopone	Lb.			3,231,722	169,982	2,772,654	164,221
Carbon, bone and lamp black	Lb.		1,512,054				
Bone black	Lb.			2,056,593	117,014	2,426,248	154,564
Carbon and lamp black	Lb.			17,062,311	2,028,105	26,481,810	4,389,177
Red lead and litharge	Lb.	1,095,173	115,500	3,366,375	294,133	3,456,290	350,954
Sublimed lead	Lb.			524,975	36,584		
White lead	Lb.	10,321,415	993,130	9,196,656	710,765	9,590,741	772,891
Other chemical pigments	Lb.		1,196,389	4,296,792	367,146	5,821,277	583,896
Paints, stains and enamels							
Enamel paints	Lb.			1,501,520	418,521	1,976,600	547,693
Flat interior paints	Gal.			14,503	34,807		
Other ready-mixed paints	Gal.	1,397,043	3,150,804	1,337,393	2,734,325	1,719,066	3,489,965
Other paints	Lb.		3,339,610	10,188,393	1,720,360	10,764,393	1,814,223
Varnishes							
Spirit varnishes	Gal.			46,348	80,127		
Oil varnishes	Gal.			376,416	657,117	517,301	938,144
Other varnishes	Gal.			352,331	533,844	370,449	564,548
Fertilizers and fertilizer materials	Ton	895,443	16,117,123	935,008	16,648,372	1,045,204	19,525,496
Calcium cyanamide	Ton			2,556	26,112		
Sulphate of ammonia	Ton	102,614	6,098,406	147,331	8,736,611	142,024	10,237,462
Other nitrogenous materials	Ton			1,576	78,047	13,161	606,851
Phosphate materials							
Bone phosphates	Ton			273	15,095		
Phosphate rock							
High grade hard rock	Ton	182,594	2,592,541	202,300	2,545,587	187,039	2,378,001
Land pebble	Ton	544,425	4,627,875	512,777	3,369,179	598,845	3,125,147
Other phosphate rock	Ton	6,293	99,721	4,217	40,401	2,343	19,337
Superphosphates (acid phosphate)	Ton	4,278	96,303	24,373	360,402	41,198	522,550
Prepared fertilizer mixtures	Ton			14,416	690,972	16,935	777,182
Other fertilizers	Ton	55,239	2,602,277	25,189	882,966	43,659	1,858,960
Explosives	Lb.	10,433,830	2,285,849	19,212,449	3,400,391	19,597,638	3,286,633
Gunpowder	Lb.	866,388	469,850				
Smokeless powder	Lb.			925,840	369,848	1,689,994	560,539
Other gunpowder	Lb.			410,705	129,216	381,066	179,151
Blasting powder	Lb.			3,227,956	366,686	1,286,934	108,155
Dynamite	Lb.	9,567,442	1,815,999	14,105,017	2,406,398	15,469,787	2,281,548
Nitrocellulose	Lb.			125,308	54,267		
Other explosives	Lb.			417,623	73,976	769,857	157,240
Soap							
Toilet or fancy	Lb.		2,822,927	7,565,881	2,869,007	6,867,664	2,795,544
Laundry	Lb.			67,079,838	4,694,406	62,634,385	4,425,523
Other soap	Lb.	73,952,439	6,214,358	14,173,788	1,349,697	15,614,035	1,377,101
Perfumery and toilet waters	Lb.		4,736,946	726,489	504,167	591,623	513,238
Talcum and other toilet powders	Lb.			3,652,604	1,397,674	3,530,911	1,521,688
Creams, rouges, and other cosmetics	Lb.			2,071,263	966,133	2,014,948	1,012,020
Dentifrices	Lb.			4,026,935	2,403,497	2,810,638	2,262,636
Other toilet preparations	Lb.			1,849,063	1,037,929	1,752,690	1,044,117
Pyroxylin products, known as cellulois, pyralin, viscoloid, fiberloid, etc	Lb.		2,276,722				
In blocks, sheets, or rods	Lb.			1,225,033	1,494,372	1,841,524	2,252,989
Manufacturers of	Lb.			635,986	880,166	601,723	862,193
Blackings and polishes	Lb.		1,334,465				
Shoe polishes	Lb.			5,173,840	1,188,552	5,024,432	1,113,424
Other blackings and polishes	Lb.			3,913,206	567,932	2,437,119	409,163
Clays							
Kaolin, china and paper	Ton			1,894	29,194		
Fire clay		21,130	177,979	21,778	169,664	42,288	278,209
Other clays		21,231	183,449	18,923	240,068	29,892	302,995
Chalk, manufacturers of	Lb.		309,889	1,272,354	209,018	1,104,817	134,478
Magnesia and manufactures of	Lb.			3,831,681	223,686	5,183,046	322,575
Graphite							
Unmanufactured	Lb.	1,841,578	95,998	1,138,708	78,094	1,655,976	123,801
Manufactures of	Lb.		679,359	2,028,423	255,019	1,962,484	313,781
Metal polishes	Lb.		301,901	3,602,952	400,186	2,011,074	251,568

Imports of Chemicals and Allied Products

		12 Months Ended December				11 Months Ended November	
		1921		1922		1923	
		Quantity	Value	Quantity	Value	Quantity	Value
Albumen, egg	Lb.	4,638,529	$1,159,772	6,569,546	$2,066,981	6,362,025	$5,145,466
Animal and fish oils, fats and greases:							
Whale oil	Gal.			48,277	17,162	3,809,510	1,986,560
Cod and cod-liver oil	Gal.	2,209,031	927,251	1,809,478	855,563	2,101,204	1,216,486
Other fish oils	Gal.			44,091	10,913	710,133	233,830
Animal oils, n.e.s.	Gal.	952,719	301,830	4,936,014	2,733,351		
Beef and hog fats	Lb.	3,057,493	252,078	2,127,763	151,830	11,156,787	860,973
Grease and oils, n.e.s.	Lb.	19,592,951	1,149,644	11,042,968	1,230,250	9,595,513	529,499
Gelatin, edible	Lb.			702,059	223,543	2,855,250	810,497
other	Lb.			490,856	216,487	1,954,386	886,351
Glue and glue size	Lb.	3,489,460	590,483	5,794,046	699,335	6,763,656	604,846
Casein	Lb.	9,717,238	842,753	14,342,498	1,367,828	24,927,249	4,231,368
Beeswax and other animal wax	Lb.	2,492,707	480,862	3,182,714	687,742	3,108,472	604,821
Oil cake and meal:							
Bean	Lb.			4,282,420	87,683	26,200,075	464,986
Coconut	Lb.			33,584,131	1,044,314	56,399,632	611,665
All other	Lb.			8,048,521	143,582	22,025,604	405,631
Vegetable tallow	Lb.	6,701,108	1,125,878	7,706,106	1,220,922	8,543,285	588,408
Vegetable wax	Lb.		377,099		548,099	8,901,281	1,266,434
Gums, resins and balsams copal, Damar and Kauri	Lb.	17,628,044	2,069,346	29,053,463	3,327,740		
Damar	Lb.			2,006,721	344,129	10,031,801	1,340,114
Kauri	Lb.			2,406,634	415,752	8,541,603	1,947,200
Shellac	Lb.	27,840,965	13,618,473	25,162,510	14,915,636	37,022,441	22,161,475
Other varnish gums	Lb.			8,273,882	871,674	34,506,174	3,761,063
Tar, pitch and turpentine					27,143		152,576
Gum, Arabic	Lb.	7,556,047	624,789	8,191,736	798,010	9,790,851	1,233,446
Tragacanth	Lb.			238,924	142,484	1,162,810	564,008
Gambier	Lb.	7,022,790	269,912	9,003,374	433,307	6,178,172	430,360
Asafetida	Lb.			32,423	13,377	8,391,216	875,879
All other	Lb.	12,937,864	1,442,475	9,957,219	1,363,848	32,506	47,581
Oil Seeds							
Cotton seed	Lb.			39,783,718	$303,249	52,182,553	659,819
Castor beans	Lb.	36,565,000	$906,857	81,673,345	2,409,385	81,747,314	2,811,208
Copra	Lb.	189,320,950	7,381,863	252,697,857	9,303,817	315,046,085	12,662,810
Flaxseed	Bu.	12,326,244	20,439,201	14,913,161	31,106,603	23,258,494	46,690,930
Poppy seed	Lb.			3,316,023	292,099	5,597,250	572,608
Other oil seeds	Lb.	230,194	18,859	6,540,525	282,688	33,158,429	1,400,099
Vegetable oils and fats							
China wood oil	Gal.	3,633,185	2,469,659	10,825,949	7,891,251	11,086,313	12,708,527
Coconut oil	Lb.	189,716,814	15,323,753	221,163,918	15,937,757	154,867,606	11,122,065
Cocoa butter	Lb.	2,302,669	519,455	8,291,964	2,068,185	417,457	97,726
Cotton seed oil	Lb.	668,551	58,184	20,779	3,500	25,044	1,256
Olive oil, edible	Lb.	49,710,742	11,150,774	61,186,645	11,811,146	72,145,170	11,468,213
inedible	Gal.	2,537,096	1,501,557	3,571,706	1,963,589	5,354,708	3,353,268
Palm oil	Lb.	23,155,230	1,421,503	57,516,079	3,771,898	118,336,205	8,662,003
Peanut oil	Lb.	3,020,505	314,353	2,469,938	281,492	7,663,437	719,635
Linseed oil	Lb.	60,090,713	4,015,959	144,136,792	10,927,671	42,996,903	4,204,806
Soya bean oil	Lb.	17,282,967	700,833	17,294,094	1,013,173	41,660,110	2,678,713
Other vegetable oils	Lb.		112,116		206,864	19,440,366	2,029,822
Dyeing and tanning materials (vegetable)							
Logwood	Ton	26,740	636,932	33,096	616,462	30,502	554,165
Mangrove bark	Ton	2,260	119,646	3,478	87,379	5,586	160,078
Myrobalans	Ton			4,130	86,880	26,856	583,243
Quebrachowood	Ton	6,547	108,119	54,107	627,970	24,236	382,436
Sumac	Ton	4,400	215,817	5,527	281,723	6,081	349,176
Valonia	Lb.			986	72	15,442,727	304,842
Other crude	Lb.		909,349		1,023,733	72,864,198	1,327,609
Extracts for dyeing, etc	Lb.	1,043,225	85,050	3,151,801	214,030	4,464,079	323,197
Extracts for tanning							
Quebracho	Lb.	144,398,673	6,448,910	100,564,987	4,189,061	120,871,276	4,079,046
All other	Lb.	10,131,473	486,775	7,207,222	251,974	5,884,436	168,287
Starch	Lb.	5,984,198	247,843	8,014,490	334,623	12,345,464	382,918
Mineral oil							
Crude petroleum	Gal.	5,265,287,319	66,547,379	5,346,953,774	70,383,309	3,094,168,846	48,072,543
Lubricating, illuminating fuel oil, and unfinished products	Gal.	105,487,921	7,169,121	115,405,578	7,547,058		
Fuel oils	Gal.			123,778,279	1,656,788	472,194,735	6,715,519
Tops and distillates	Gal.			49,142,561	2,257,766	25,679,844	1,539,303
Gasoline, naphthas	Gal.	37,816,004	3,673,137	72,551,801	5,959,109	162,310,318	12,658,963
Illuminating oil	Gal.			146,450	40,576	301,403	55,646
Lubricating oils	Gal.			1,808,169	341,057	1,216,146	194,534
Paraffin and paraffin wax	Lb.	4,546,176	325,344	7,447,213	299,480	11,711,382	502,021
Asphalt and bitumen	Ton	114,763	1,129,290	111,302	1,000,463	121,717	1,012,225
Lime and limestone crude	100 lb.			115,997	73,248	456,321	391,322
Kaolin, china and paper clay	Ton	146,452	1,555,724	276,968	2,966,805	261,281	2,870,372
Other clays	Ton	45,687	469,503	48,000	492,281	64,863	583,378
Chalk, unmanufactured	Ton	64,699	2,948,302	133,417	5,169,801	112,208	162,229
manufactures of	Lb.		69,839		109,503	8,237,125	102,890
Pyrites or sulphuret of iron	Ton	216,229	818,852	269,947	1,136,548	234,916	1,218,299
Talcum, steatite, French chalk	Lb.	22,911,226	238,581	36,527,970	371,329	37,176,277	397,748
Salt	100 lb.	1,861,901	531,031	2,276,245	523,036	1,844,608	380,423
Mineral wax	Lb.	8,548,542	546,054	8,989,972	371,161	4,575,719	189,633
Chrome ore	Lb.	183,312,640	654,602	201,781,310	741,186	114,893	994,738
Aluminum ore, crude bauxite	Ton	31,575	241,806	27,448	154,546	101,883	505,278
Antimony ore	Lb.	196,107	11,682			1,762,222	35,857
Quicksilver	Lb.			168,119	101,865	1,370,616	801,205
Zinc dust	Lb.		549,332		75,393	60,045	15,048
Chemicals and Allied Products (total)	free		$53,153,467		$63,126,239		$78,048,274
	dut		27,610,180		37,477,505		33,854,041
Chemicals (total)			40,309,423		41,419,660		43,375,187
Coal-tar chemicals (total)			11,225,688		11,012,769		15,992,871
Coal-tar products, crude:							
Benzene	free	Lb.	1,722,085	43,270	172,528	1,223	701,901	21,937
Dead or creosote oil	free	Gal.	33,239,432	4,736,618	41,567,537	4,240,449	59,610,325	9,356,795
Naphthalene	free	Lb.	4,495,796	135,941	3,144,332	54,029	19,108,844	535,111
Tar and pitch	free	Bbl.	21,968	48,048	24,853	58,517	14,424	45,616
Toluene	free	Lb.			144,237	6,061	194,660	7,928
Other crude coal-tar products	free			298,453		380,122	7,566,720	684,802
Intermediates—								
Acids—								
Carbolic	dut	Lb.	250	142	686,304	102,282	61,561	14,752
All other	dut	Lb.	11,263	3,012	73,859	17,561	18,834	79,132
Other intermediate products	dut	Lb.	1,257,884	353,711	1,376,566	902,310	2,442,354	492,707
Finished products—								
Alizarin and derivatives	dut	Lb.	375,112	510,038	479,858	701,943	248,662	366,058
Colors or dyes, n.e.s.	dut	Lb.	3,106,355	4,445,348	[12]2,553,576	[13]3,762,841	8,269	8,687

Imports of Chemicals and Allied Products—Continued

			12 Months Ended December				11 Months Ended November	
			1921		1922		1923	
			Quantity	Value	Quantity	Value	Quantity	Value
Anthracene and carbazole colors and dyes	dut	Lb.			[3]17,697	[3]$26,002	4,263	$3,635
Color lakes	dut	Lb.			[3]239	[3]262	9,854	4,669
Indigo—								
Natural	dut	Lb.	52,489	$85,695	12,450	13,848	631	458
Synthetic	dut	Lb.	408,262	200,903	72,218	101,448	13,721	18,084
Dyes, colors, stains, etc.	dut	Lb.			[3]872	[3]1,482		
Colors, dyes, stains, color acids, and color bases, n.e.s.	dut	Lb.			[3]738,359	[3]1,006,924	3,005,315	4,107,749
Imported from—								
Germany		Lb.					1,425,723	1,767,162
Switzerland		Lb.					819,478	1,278,645
United Kingdom		Lb.					96,034	96,641
Other countries		Lb.					664,080	965,301
Coal-tar medicinals	dut	Lb.		281,607		208,670	58,338	190,006
Explosives	dut	Lb.			[3]5,470	[3]6,843	2,042	3,494
Other finished coal-tar products	dut	Lb.		63,802		19,961	14,831	51,251
Other chemicals:								
Acids and anhydrides—								
Arsenious acid or white arsenic	free	Lb.			[3]1,740,963	[3]132,568	18,335,527	1,695,654
Citric	dut	Lb.			[3]112,686	[3]40,442	775,570	237,463
Formic	dut	Lb.			[3]255,397	[3]18,113	1,134,804	83,437
Oxalic	dut	Lb.	1,256,320	184,487	1,294,236	127,757	2,402,856	190,155
Sulphuric	free	Lb.			[3]1,260,000	[3]12,222	21,796,839	183,783
Tartaric	dut	Lb.			[3]628,972	[3]171,567	2,356,335	582,024
All other	free	Lb.	10,180,050	353,833	2,430,128	87,296	1,658,584	17,412
	dut	Lb.	4,974,390	1,126,631	5,480,222	1,242,983	2,252,355	306,662
Alcohols including fusel oil	dut				[3]	[3]14,867		1,133,427
Fusel oil	dut	Lb.	1,046,434	195,511	[3]181,662	[3]16,448		
Ammonia compounds, n.e.s.—								
Muriate of ammonia	dut	Lb.	4,638,275	271,398			5,615,998	301,767
Nitrate	dut	Lb.			[3]7,936,714	[3]417,159	19,515,507	1,271,183
Perchlorate	dut	Lb.			[3]259,938	[3]14,818	1,111,392	36,688
All other	dut	Lb.			[3]8,299,267	[3]450,764	1,716,749	96,046
Arsenic sulphide (realgar and orpiment)	free	Lb.	6,686,570	531,322	7,630,519	472,044	2,171,640	265,861
Barium compounds	dut	Lb.			[3]3,854,736	[3]148,235	6,778,635	271,267
Calcium compounds—								
Acetate, carbide, chloride crude and nitrate	free	Lb.	84,750,243	3,440,019	[1]52,376,677	[1]1,784,559		
Acetate crude, and chloride	free	Lb.			[3]2,242,605	[3]36,023	5,731,081	42,933
Cobalt oxide	dut	Lb.			[3]47,950	[3]94,590	232,892	458,710
Lime—								
Chlorinated, or bleaching powder	dut	Lb.	12,438,484	229,113	8,534,709	135,673	1,325,813	47,530
Citrate	dut	Lb.	988,969	151,811	15,981,682	2,222,795	1,647,415	197,717
Glycerin	dut	Lb.	2,806,758	397,366	3,657,068	354,369	14,211,453	1,419,280
Iodine, crude	free	Lb.	646,211	1,430,664	352,557	1,024,609	274,238	887,460
Potassium compounds—								
Cyanide	free	Lb.	3,771,687	319,683	3,088,108	253,072	2,135,268	176,501
Carbonate	free	Lb.	7,517,717	282,310	[3]8,227,817	[3]299,418		
Ferrocyanide	dut	Lb.			[3]1,780,508	[3]86,722	10,031,998	539,651
	dut	Lb.			290,089	70,847	391,577	88,088
Hydrate	free	Lb.	10,910,399	487,187	[1]11,537,057	[1]643,891		
Hydroxide	dut	Lb.			[3]2,104,986	[3]120,765	8,991,145	580,327
Nitrate crude, or saltpeter	free	Ton	7,408	590,200	2,438	141,521	1,874	95,048
Bitartrate, crude, argols or wine lees	dut	Lb.	16,087,934	1,176,546	22,965,618	1,709,184	17,784,704	1,367,734
Other potassium compounds	dut	Lb.	8,127,521	486,861	12,381,488	757,404	21,234,227	1,585,143
Sodium compounds—								
Cyanide	free	Lb.	8,707,537	913,091	15,705,474	1,306,071	26,795,030	2,204,931
Ferrocyanide	dut	Lb.			[3]1,198,064	[3]220,506	1,048,953	174,975
Nitrite	dut	Lb.			[3]1,548,438	[3]62,407	4,602,568	204,295
All other, n.e.s.	free	Lb.		312,287		74,759	28,340,045	446,739
	dut			945,771		1,129,258		877,453
All other chemicals, n.e.s.	free			7,593,047		5,043,015		1,219,189
	dut			3,794,477		4,705,919		3,213,609
Paints, pigments, and varnishes (total)				2,362,318		3,673,139		2,987,807
All, except zinc pigments	dut			1,759,240		[1]1,736,723		
Mineral earth pigments—								
Ochers and siennas	dut	Lb.			[3]5,350,906	[3]97,956	20,305,038	332,396
Other	dut	Lb.			[3]18,648,536	[3]254,275	71,166,840	918,546
Chemical pigments—								
Zinc pigments	dut	Lb.	13,256,498	603,078	27,845,963	1,290,329	18,215,507	786,822
All other	dut				[3]	[3]155,203		511,832
Paints, stains, and enamels	dut	Lb.			[3]443,815	[3]113,684	888,335	363,916
Varnishes	dut	Gal.			[3]6,166	[3]24,969	19,815	74,295
Fertilizers (total)		Ton	683,639	30,687,588	1,340,025	45,183,574	1,662,732	57,229,331
Nitrogenous—								
Calcium cyanamid	free	Ton	16,09	959,117	41,807	2,236,474	55,394	3,038,038
Calcium nitrate	free	Ton			[3]1,097	[3]46,508	8,143	350,545
Sodium nitrate	free	Ton	369,173	17,982,977	542,464	26,152,723	803,899	37,964,971
Sulphate of ammonia	free	Ton	4,677	260,390	14,542	[1]235,746		
	dut	Ton			[3]348	[3]24,426	356	28,034
Other nitrogenous	free	Ton	6,208	343,777	45,653	1,787,442	101,542	3,373,709
Phosphates—								
Bone phosphates	free	Ton	21,516	799,591	32,274	860,683	50,591	1,521,781
Other phosphate material	free	Ton			[3]4,831	[3]70,912	10,955	148,033
Potash fertilizers—								
Chloride, crude (muriate of potash)	free	Ton	71,109	4,777,726	161,546	5,549,852	120,968	3,687,371
Sulphate, crude	free	Ton	11,124	719,183	57,719	2,429,416	56,941	2,322,858
Kainite	free	Ton	69,076	1,453,854	149,857	1,023,330	141,243	831,055
Manure salts	free	Ton	38,648	792,601	195,005	2,009,608	251,812	2,753,789
Other potash-bearing substances	free	Ton			[3]3,295	[3]41,740	32,431	401,504
All other fertilizers	free	Ton	76,011	2,598,372	99,587	2,714,714	28,457	807,643
Explosives:								
Powders and explosive substances	free	Lb.	96,631	112,623	114,574	109,716	150	71
	dut			557,517		[1]569,247		
Azides, fulminates, dynamite, etc., and powder from country imposing duty	dut					[3]88,376		172,914
Firecrackers	dut	Lb.			[3]791,521	[3]93,696	4,190,520	557,571
Fireworks and ammunition	dut	Lb.			[3]421,442	[3]120,882	530,828	126,284
Soap:								
Castile	dut	Lb.	1,559,270	204,917	2,703,888	341,298	1,693,937	168,860
Toilet	dut	Lb.			[3]219,393	[3]73,497	847,733	261,698
All other	dut	Lb.	1,343,294	333,043	2,202,398	498,937	2,465,341	247,885
Perfumery and cosmetics	dut	Lb.		6,043,028		[1]5,773,884		
Perfumery, including cologne	dut	Lb.			[3]405,090	[3]937,971	1,068,222	2,160,509
Bay rum, toilet waters, and floral waters	dut	Lb.			[3]98,857	[3]27,920	281,872	53,665
Perfume materials	free	Lb.			[3]12,122	[3]274,736	54,093	1,056,208
	dut					[3]494,698		1,145,425
Cosmetics, powders, creams, etc.	dut	Lb.			[3]375,775	[3]235,636	1,250,097	1,651,911
Cellulose products	dut	Lb.		153,190		677,145	1,201,307	648,698
Blackings and polishes	dut	Lb.			[3]55,207	[3]9,732	461,287	58,297

News of the Industry

Summary of the Week

Alcohol hearing before Ways and Means Committee develops opposition to reduction in excise tax.

German chemists successful in developing specific for sleeping sickness.

Mexican forces eager to secure supplies necessary to conduct chemical warfare.

Acetate of lime from Canada may be imported free of duty, according to Treasury announcement.

Muscle Shoals developments continue with fourth offer made following conference between Weeks and Hooker.

Hartness succeeds Cooley as president of F.A.E.S. Important business transacted at Washington meeting of council.

Catalysis symposium held at M.I.T. under auspices of the Northeastern Section of A.C.S.

Larger Production of Arsenic in 1923

Geological Survey Reports Total Output of 14,184 Tons—Imports Brought Supply Up to 22,000 Tons

THE refined and crude arsenic produced in the United States in 1923, according to an estimate issued by the Department of the Interior through the Geological Survey, amounted to 14,184 short tons, valued at $2,966,753, or an average value of 10½c. a pound. This quantity is a little less than that given in the estimate made in December. The sales of refined arsenic, having a purity of 99.5 per cent or more, amounted to 12,192 tons, and the sales of crude arsenic, having a purity of 70 to 95 per cent, amounted to 1,992 short tons. Considerable crude arsenic was used in the manufacture of weed killer and distributed to Eastern and Western railroads for use on their rights of way. The stock of domestic arsenic at points of manufacture was small—in fact, no more than 200 tons of refined arsenic was on hand Oct. 31.

Imports—During the first 11 months of the year 9,168 short tons of white arsenic, valued at $1,695,654, was imported. Most of it came from Germany, Japan and Mexico, but some came from Belgium, France, England, China and Brazil. The imports of white arsenic at the Eastern, gulf and lake ports exceeded those at ports on the west coast. Notwithstanding the predictions of brokers early in the year, higher prices did not stimulate the accumulation of additional supplies from foreign countries. Imports of arsenic sulphide amounted to 1,086 short tons, valued at $265,861.

Consumption—The total white arsenic bought for consumption in 1923 from domestic and foreign sources was about 22,000 tons, less than one-third of which was made into calcium arsenate; the remainder was made into other insecticides, weed killer and cattle dip, or used by glass manufacturers.

Sources of Domestic Supplies—Eight producers in the United States reported the production of arsenic. Three smelting companies contributed 90 per cent of the total output of arsenic. Lead smelters made fully 80 per cent of the total smelter output of arsenic. About half the total domestic output was made from charges of regular furnace ore at the smelters, and 40 per cent came from arsenical ores and speiss purchased. Nearly 10 per cent of the total came from two plants that treat ore primarily for arsenic.

Of the arsenic contained in ore smelted in blast furnaces, probably 25 to 50 per cent is saved. A larger recovery has been reported from plants that use direct roasting, where the fume is caught in "kitchens" and bag houses. If the future demand for arsenic warrants the expense of equipment, it may be found more profitable to treat arsenical ores directly.

No new discoveries of arsenic ore were made in 1923, and the most productive sources of arsenic were the mines of Gold Hill, Utah; Jardine, Mont., and Eureka and Battle Mountain, Nev.

The reserves of arsenical ores, however, have been considerably increased during the last year in Montana, Utah and Nevada, and the development of arsenical properties in Colorado, South Dakota, Washington and California may open up new sources of arsenic in 1924.

At Toulon, Nev., and Jardine, Mont., two plants were operated directly on arsenical ore and concentrate during the entire year. The residues left from roasting were shipped to smelters. Though these plants were metallurgically successful and probably profitable, their success has not prompted the construction of other plants. At Martinez, Calif., an arsenic plant was started late in the year, and some arsenical ore and concentrate was shipped to it from Nevada and the coast states.

Mustard Gas Sought by Mexican Forces

"With the first sign of war belligerents in the future will turn instinctively to poison gas." This prediction made at the Arms Conference is borne out by recent events in Mexico. There has been a scramble on the part of each contestant in the internecine warfare south of the Rio Grande to secure the supplies necessary to undertake a chemical offensive. So far as has been learned, neither side has been able to secure supplies of gas. That they may do so at any time is entirely possible. The rebels hold the port of Vera Cruz, to which shipments could be sent were agents of the insurgents able to get possession of gas. Shipments could be made to the federal forces through the all-rail ports, as there is no embargo against such shipments to the recognized authorities. It is admitted in Washington that were either one of the contestants to secure a considerable supply of gas and equipment, it would insure a decisive victory.

It is understood that there are no stocks of mustard gas in the United States and probably in no other country. Such of the gas as is available is promptly used in connection with the manufacture of dyes and certain medicinals.

The thought has been advanced that German interests might be in a position to supply a certain amount of mustard gas, but the impression among government chemists is that Germany has no stocks of the material.

Reduction in Excise Tax on Alcohol Advocated and Opposed

Opposition Based Largely on Depreciation of Inventories Should the Tax Be Repealed or Modified

ELIMINATION or reduction of the excise tax on alcohol was advocated by representatives of some manufacturing consumers and opposed by others before the ways and means committee Jan. 14 during public hearings on the proposed revision of the revenue law.

Frank A. Blair, of New York, representing the Proprietory Medicine Manufacturers Association; Eugene C. Brokmyer, general counsel of the National Association of Retail Druggists; W. L. Crounse, Washington representative of the American Manufacturers of Toilet Articles; and J. M. George, Winona, Minn., representing the Interstate Manufacturers Association, which includes a group of producers of extracts for household use, urged repeal of the tax or reduction from the present figure of $2.20 per proof gallon to the pre-war tax of $1.10. Opposing any change were J. A. Sailer, Baltimore, of Sharpe & Dohme, representing the American Drug Manufacturers Association; Horace W. Bigelow, counsel for that association, and Richard H. Bond, Baltimore, vice-president of the Flavoring Extract Manufacturers Association of the United States.

The tax is discriminatory, Mr. Blair argued, stating that of the $4.72 per wine gallon he pays for alcohol, $4.17 represents tax. Retail druggists favor repeal of the tax, Mr. Brokmyer said, but would be satisfied with a cut of 50 per cent to the pre-war figure. In reply to questions from members of the committee, Mr. Brokmyer asserted that consumers would derive benefit from a reduction in the tax.

Mr. Sailer denied the consumers would benefit. The amount of alcohol used in an ordinary prescription is so small that a reduction in the alcohol tax could hardly be passed along to the consumer, he declared. The present tax is passed along to the public in such small sums that it is not felt, he said.

The main reason advanced by Mr. Sailer in opposition to any change was that inventories would suffer heavy losses. The stock of his company, he asserted, would depreciate $200,000 to $250,000 on a $500,000 inventory on a 50 per cent cut in the tax.

A.C.S. Catalysis Symposium at M. I. T. Well Attended

Leaders in the Field Discuss Theories of Catalytic Action in Enthusiastic Meeting

The Northeastern clan of the American Chemical Society gathered at the Massachusetts Institute of Technology on Saturday, Jan. 12. Prof. J. B. Conaut, chairman of the program committee, had arranged a symposium on catalysis and the meeting was announced as a New England intersectional meeting. About 500 attended the various meetings and a vast majority stayed through from luncheon till adjournment at 10 p.m.

Gustavus G. Esselen, chairman of the Northeastern Section, called the first meeting to order after an informal luncheon and introduced Prof. Wilder D. Bancroft of Cornell as chairman of meeting. The choice was a happy one, for no meeting ever lagged with Bancroft as chairman. His comments are not only agile and enjoyable but weighted with scientific vision that is stimulating.

Professor Bancroft's own paper was the first on the program. He discussed theories of contact catalysis in the light of some photochemical work that he is carrying out. The discussion was animated and stimulating. He was followed by H. S. Taylor of Princeton, who spoke on "negative catalysis," proving first that there was such a thing as negative catalysis and subsequently discussing its mechanism. James F. Norris of Massachusetts Institute of Technology followed with a paper discussing factors determining the strength of organic bonds based on some researches in that he is carrying out.

After a pleasant informal dinner in the Walker Memorial Building the meeting reconvened to hear a splendid address by A. T. Larson of the Fixed Nitrogen Research Laboratory on the commercial catalyst used in the synthetic ammonia process. The last speech, by Colin G. Fink of Columbia, dealt with the promoter action of various metals in corrosion-resistant alloys and the meeting adjourned after a vote of appreciation.

It will be our privilege to report the technical papers in considerable detail next week in the technical pages of *Chem. & Met.* The report had to be held over till then as this issue is completely taken up with the Market Reviews of 1923.

Germans Want Briquet Plant in Saskatchewan

Entry of German capital as a factor in the development of the lignite deposits along the Saskatchewan-North Dakota border has been marked by the visit of Dr. Hans Holzwarth, representative of Thyssen & Co., Mannheim, to Saskatchewan.

The German firm proposes to introduce a new briquetting process perfected in Germany, which, according to Dr. Holzwarth, will produce fuel equal in firing efficiency to anthracite. Options on land have already been secured.

Cooley Succeeded by Hartness

Government Reorganization, Education and Other National Problems Discussed at Council Meeting

An outstanding event of the recent meeting of the American Engineering Council of the Federated American Engineering Societies, held in Washington, Jan. 10 and 11, was the election of ex-Gov. James Hartness of Vermont, a former president of the A.S.M.E., to succeed Dean M. E. Cooley of the University of Michigan as president. President Hartness immediately took up his new duties, following the conference, and an active program for 1924 was mapped out. Foremost among the Council's activities will be the direction of the public works enterprise and the development of closer working contact with member societies.

In addition to the election of Hartness, the new plan of government reorganization were discussed, as were other possible plans for attaining the same end. Approximately 100 organizations from all parts of the United States took part in this conference, at which resolutions embodying the aims of the engineers, architects, contractors and allied bodies declared that "this conference particularly indorses grouping and co-ordinating within an existing department, preferably renamed department of public works, the construction and administration of all non-military public works." Secretary Hoover in commenting upon this measure, urged the point that no separate bill for bringing about this end could possibly pass Congress and that the problem of regrouping public works functions was inseparably tied up with the larger problem of general reorganization.

Engineering Education Discussed

Several other matters came up for discussion, and among these was the problem of engineering education. Both Secretary Hoover and Dr. Nicholas Murray Butler, of Columbia, emphasized the need of greater engineering participation in the social, economic and politcial life of the country. Ambassador Caetani outlined a plan by which graduates of Italian technical schools will be brought to America and provided employment in the industries here. Industrial mobilization plans of the War Department were discussed by Assistant Secretary Davis, who appealed for the co-operation of the engineer, which was unanimously tendered at a business session of the Council.

In his farewell address to the Council, Dean Cooley said that the progress of industry and social well being were so intimately bound up with engineering that this profession could no longer be held back. He added: "The American engineer should recognize that the growth of our civilization has imposed upon him other duties than those to which he has long been accustomed. The world needs his training applied in new fields."

Washington News

Benzol Will Be Produced in India

A report from Acting Trade Commissioner Charles B. Spafford, Jr., at Calcutta states that the announcement of the Bararee Coke Co. that it has placed in operation what is believed to be the first plant for the recovery of benzol in India is regarded as a further step forward in the country's industrial development. The installation of this modern designed benzol plant makes an important addition to the company's ammonium sulphate plant and battery of thirty-five Simon Carves waste-heat ovens, which are producing a high-grade coke for the local blast furnaces. From the coke-oven gases, tar, ammonia in the form of ammonium sulphate, and crude benzol are recovered. The tar is put through the tar-distillation plant to yield carbolic oils, creosote oils, anthracene oils and pitch. The benzol vapors are recovered from the gases by scrubbing with creosote oil obtained from the tar-distillation plant and crude benzol is then separated from the creosote oil by distillation.

Pulp and Paper Men to Discuss Forestry With U. S. Officials

A meeting of the committee representing the pulp and paper industry of the country has been called by Secretary of Agriculture Wallace for Feb. 7, according to an announcement issued by the United States Department of Agriculture. Notice of the meeting, which will be held in Washington, was sent to Hugh P. Baker, secretary of the American Paper & Pulp Association, New York City, and to seventeen other representatives of the industry.

This meeting is considered by forestry officials of the Department of Agriculture to be important from the standpoint of attempting to solve the timber supply and other problems now confronting American pulp and paper manufacturers and consumers.

The program of the Feb. 7 meeting includes an address by Secretary Wallace on "The Paper Industry and National Forest Policy," an address by George W. Sisson, Jr., president of the Racquette River Paper Co., on "Co-operation Between the Industry and the Department of Agriculture," and an address by Norman W. Wilson, vice-president of the Hammermill Paper Co., on "The Future Development of the Paper Industry."

In addition, Carlile P. Winslow, director of the Forest Products Laboratory; Samuel T. Dana, director of the New England Forest Experiment Station; Raphael Zon, director of the Lake States Experiment Station, and Charles W. Boyce, forest economist, will speak on the Department of Agriculture's program of investigations concerning the growing of future crops of timber for pulpwood and processes of pulp making.

The discussions will be led by W. E. Haskell, vice-president of the International Paper Co.; D. C. Everest, secretary and general manager of the Marathon Paper Mills Co.; F. C. Clark, vice-president of the Pejepscot Paper Co., and Hugh P. Baker, secretary of the American Pulp & Paper Association.

Spain Lacks Coloring Materials for Cement Tiles

Spain, an important manufacturer of colored cement tiles, is having great difficulty in securing reliable coloring materials for use in that connection, a report to the Department of Commerce indicates. Southern Europe for centuries has used tiles extensively for interior decoration. Cement tiles now have largely replaced the earlier baked earth tiles and those of glazed porcelain.

Some very striking color effects are obtained in the cement tiles, but there is great limitation in the variety of colors, and much difficulty is experienced in maintaining exact shades. There is difference of opinion as to whether the cement acts chemically upon the coloring materials or whether alteration and decolorization is a consequence of mixing the component parts of the colors themselves.

Report on World Consumption of Fertilizers in March

The International Institute of Agriculture at Rome announces that the new edition of its report on "Production and Consumption of Fertilizing Materials Throughout the World" will be available in March. The data in the report have been brought up to date and much new material is included in this edition.

Cuban Tanners Plan to Increase Production in 1924

The ten tanneries in the Matanzas consular district of Cuba, four of which are at Cardenas and six in the city of Matanzas, produce annually 5,000,000 lb. of leather. The large tanneries produce 1,300,000 lb. annually and the small tanneries only 175,000 lb. The cost of tanning varies at the different plants from 6 to 9 cents a pound, according to Vice-Consul James V. Whitfield.

Tanning extract from the mangrove tree is used by most of these tanneries. The extract made from the leaves is used exclusively to tan white sole leather, while that produced from the bark is used for many different kinds of leather. The leaves are obtained locally, but the bark is imported from the United States, and a small amount from Venezuela. Other barks, and raw materials used in making extracts, are imported from the United States—chestnut, mimosa, myrobalan and oak.

The past year has been the most prosperous for the tanners since 1919. The tanners are planning to increase production to meet the increased demand for their product, and due to the general favorable economic condition of Cuba a very successful year is expected by the tanning industry as a whole.

Austrian Arsenic Ore Annual Output 90 Tons

According to reports of the Department of Commerce the only mine in Austria producing arsenical pyrites at present is the Gewerkschaft Rathousberg, of Noekstein, Salzburg. Its managing director states that 18 per cent of the concentrates of its gold and silver mining district is arsenic. The present output of arsenic ores from this mine amounts to 90 metric tons per annum. The smelting of these ores is done by the Germany state smelting works, of Freiberg, Germany, which manufactures all arsenic products.

Carbon Black Output Larger in 1922

Production of carbon black from natural gas in 1922 amounted to 67,795,000 lb. This represents a decided gain over production in preceding years. Statistics for production in the past 3 years are:

	1922	1921	1920
Production, lb.	67,795,000	59,800,000	51,300,000
Value at plants	$5,820,000	$5,446,000	$4,032,000
Average value per lb.	8.6c.	9.1c.	7.9c.

Use of Superphosphate Urged in Northwest

The Department of Agriculture is bringing to the attention of the growers of small grains in the prairie regions of the Northwest the desirability of adding phosphoric acid to their soil. While this soil is fairly productive in favorable years, it has been evident for some time that a soil property necessary to maximum production was lacking. Tests conducted with treble superphosphate showed very promising results. In one experiment the unfertilized plot produced 3 bushels of barley per acre, while the adjoining fertilized plot withstood a drought and unusually hot weather and yielded 27 bushels per acre. The use of 90 lb. of treble superphosphate per acre is being recommended for small grain.

Peru Changes Duty on Imports of Sodium Sulphide

Sodium sulphide for industrial uses when imported into Peru in quantities exceeding 500 kilos will be duitable at 10 per cent ad valorem instead of 15 centavos per gross kilo as provided in the new tariff schedule of July 1. This is an additional item and amends the resolution of Sept. 12 restricting the application of special duty rates for materials used in industries to a specified list of goods. This informations is contained in a message from the Trade Commissioner's office at Lima.

Shipments of Swiss Dyes to United States Decline in 1923

American Trade Commissioner Presents Report on Swiss Dye Industry—Swiss Interests Control American Plant

A VERY comprehensive report on the Swiss dye industry has been made by Frederick E. Breithut, American Trade Commissioner in Germany. This report states that Basel is the center of the Swiss coal-tar chemical industry. At this place there are four large companies producing dyes and other coal-tar chemicals. These companies are: Gesellschaft für Chemische Industrie in Basel, J. R. Geigy, A. G., Chemische Fabrik vormals Sandoz in Basel, L. Durand, Huguenin & Cie., A. G.

The three largest dye-manufacturing companies in Basel—namely, the Gesellschaft für Chemische Industrie (Ciba), the Sandoz company and the Geigy company—are united in an "Interessen-Gemeinschaft." This organization is not a separate corporation, but represents an agreement establishing the community of interests of the companies concerned.

The I. G. owns and operates an acid plant at Schweizerhall, near Basel, which makes sulphuric, nitric and hydrochloric acids for the three companies. It also controls the Cincinnati Chemical Works, Cincinnati, Ohio, and operates the Clayton Aniline Co. in Manchester, England.

The Swiss I. G. was formed during the war, originating through a contract made with the British Government by which the I. G. supplied England with finished commodities needed. The raw materials were shipped from England to the British consul at Basel. Later similar arrangements were made with the Government of France. A ship which was purchased by the Swiss I. G. to transport materials was sunk by the Germans on its first trip.

The three companies included in the I. G. do some purchasing in common and pool the profits. They claim that they do not have price agreements nor agreements on what products each will make. It is also claimed that they do not apportion foreign trade geographically, by commodities, or by volume of sale, and that they have no common agencies in foreign countries or system of exchanging orders. Moreover, it is asserted that they manufacture some products in competition with one another. The present community of interests, therefore, seems to consist in the ownership of the acid plant, the Cincinnati Chemical Works, the Clayton Aniline Co., in common purchasing, and the pooling of profits.

Coal-Tar Crudes

Practically no coal-tar crudes are produced in Switzerland. There are no byproduct coke ovens in the country, and aside from a very small production of benzol in some gas works this country is entirely dependent upon other countries for the raw materials of its coal-tar chemical industry. Germany supplied by far the greatest part of these raw materials to Switzerland before the war. By the year 1920, however, only 4.58 per cent of these materials were being obtained from Germany. On the other hand, England, which in 1910 was supplying 6.60 per cent, had reached a maximum of nearly 70 per cent by 1918. It is interesting to note that the United States was able to send Switzerland 27.11 per cent of its supply of these materials in 1917 and about 31 per cent in 1920.

Dye Exports to U. S.

American manufacturers are naturally most interested in the relationship of the Swiss dye industry to their own domestic production. Up to the enactment of the American tariff act now in force, Switzerland stood second only to Germany in the amount of dyes sent into the United States. However, the tariff act of Sept. 21, 1922, has had a very marked influence on the amount of dyes exported to the United States.

The value of the aniline colors exported to the United States from the Basel district during the first 6 months of 1922 was $810,568, while during the same period of 1923 they were only $373,710, representing a net loss of $436,858. The manufacturers of Basel ascribe this great falling off in the value of their exports to the United States to the operation of the new tariff act, and especially because the duties are levied on American valuation.

Germans Seek Compensation for Seized Patents

Representatives of German interests are said to have been conferring with several members of Congress in Washington recently regarding the possibility of securing passage of legislation to provide some measure of compensation for the patents seized by the government and sold to the Chemical Foundation, Inc.

What degree of encouragement, if any, was received by the Germans has not been disclosed. If legislation of this character is contemplated, it probably will not be introduced until the suit of the government against the Chemical Foundation, recently decided adversely to the government in the Federal District Court at Wilmington, Del., is finally disposed of in the courts, as the Department of Justice has announced that an appeal will be taken.

While the reports regarding the negotiations for compensation are not definite, it is understood that the German interests are concerned particularly in certain of the pharmaceutical patents and in the nitrogen patents. Few of the dye patents are said to be at issue and in fact the most valuable of these are said to have expired some time ago.

Eminent Americans to Judge A.C.S. Prize Essays

The committee elected to judge the essays submitted in the A.C.S. prize contest, made possible by a gift of Mr. and Mrs. Francis P. Garvan, includes many prominent citizens. Herbert Hoover heads the list. Dr. Charles H. Mayo of the Mayo Foundation at Rochester, Minn., represents the medical profession on the committee, Frederick E. Weyerhaeuser the lumber field and Julius Rosenwald, of Sears, Roebuck & Co., Chicago, the merchants of the country. Prominent women on the committee will be Alice Ames Winter, president of the General Federation of Women's Clubs, Ida M. Tarbell and Jane Addams. Dr. J. R. Angell, president of Yale University, and Dr. H. N. MacCracken, president of Vassar College, have accepted membership, representing the nation's educators, while the scientists will be represented by Dr. Robert Andrews Millikan, physicist, who has been the recipient of the Nobel prize; Dr. J. C. Merriam, head of Carnegie Institution, and Dr. Edgar F. Smith, past-president of the American Chemical Society and former provost of the University of Pennsylvania. General J. J. Carty, chief engineer of the American Telephone & Telegraph Co., United States Senator Arthur Capper, who will represent the agricultural interests of the country, Robert J. Cuddihy of the *Literary Digest*, George Eastman of the Eastman Kodak Co. and United States Senator James W. Wadsworth, Jr., chairman of the United States Senate Committee on Military Affairs, are also members.

German Firm Develops Specific for Sleeping Sickness

Published material reaching the Department of Commerce from abroad indicates that "Bayer 205," the specific for sleeping sickness, is justifying the claims the Germans have made for it. The remedy has placed in German hands, it has been contended, the key to tropical Africa.

Some of the facts brought out in this connection follow: "Bayer 205" was discovered 3 years ago as a result of work done at the Bayer Chemical Works in Leverkusen, near Cologne. It is extremely complicated in its composition. It contains neither arsenic nor antimony. Its only ingredients are carbon, nitrogen and hydrogen. Like Salvarsan, it is derived from atoxyl. It was christened 205 because 205 successive transformations of atoxyl were made by the Bayer chemists before the Bayer medical staff pronounced the result satisfactory enough to merit practical experiment.

Comment from British sources is very commendatory to the splendid work the German chemists have done in connection with this remedy as well as on the large number of other aniline derivatives which have the peculiar properties of destroying one kind of living protoplasm while leaving other kinds unaffected.

Fourth Muscle Shoals Offer Follows Heated Discussion of Southern Proposal

Hooker Reported to Have Conferred With Weeks—Senator McKellar Fears Foreign Influence in Proposal of Southern Companies

THE Muscle Shoals problem remains in the limelight. The week has brought a fourth proposal for the development of the property following a discussion on the floor of the Senate of the offer made by the Southern Power companies announced in *Chem. & Met.* last week.

Secretary Weeks refused to reveal the source of the last offer made by private interests, which he characterized as financially reliable. He also refused to discuss the details of the new proposal, explaining that he would have a study made by engineer and ordnance experts and later would decide what action might be taken by the department.

The receipt of the proposal was announced after the Secretary had conferred briefly with E. H. Hooker of Niagara Falls. Mr. Hooker is president of the Electrochemical Co. of Niagara Falls and is known to have discussed Muscle Shoals questions with Mr. Weeks recently.

The Southern power companies, which recently submitted an offer for electric power developed at Muscle Shoals, are preparing a new proposal by which they will agree to undertake the manufacture of nitrates and fertilizers. It is proposed by the power companies that their offers be considered separately, one relating to power development and the second to nitrate and fertilizer manufacturing. Each undertaking will be assumed by a separate corporation to be established by the companies interested.

This last announcement has an immediate connection with the dispute between Senator Norris of Nebraska and Senator McKellar of Tennesse over the original offer of the Southern group. McKellar urges that this offer be rejected because of the menace of foreign control which he sees involved. He states that he has no information as to possible German holdings of stock in some of the concerns which may become bidders for Muscle Shoals properties, but his attention has been called to the visit to Muscle Shoals of a prominent German chemist and the very evident interest which the Germans have taken in the whole question of nitrogen fixation in this country.

Of the British holdings in the stock of these companies McKellar was even less optimistic. "It is a well understood fact," he said, "that 70 per cent of the stock of the Alabama Power Co., the principal bidder, is owned by British stock and bond holders. For the United States Government to lease and turn over this plant which was built by it for the purpose of being independent of all other nations in the production of nitrates in war time to a corporation whose principal stockholders are subjects of its leading commercial rival would be little short of attempted national suicide. That it will not be done is a foregone conclusion.

"Henry Ford is the logical man to have this plant. I am now, as I have always been since the matter first came up, in favor of leasing it to him. Of course, it might be said that we could commandeer the plant in the event of war, but if Great Britain happened to be our adversary, or if she happened to be more friendly with our adversary than she was to us, the plant could be destroyed or made useless before we could possibly take it over."

Senator Norris holds that Senator McKellar's arguments bear equal force when directed against Ford's plan. "We have no assurance," he said, "that the corporation to be set up by Mr. Ford would not come within control of foreigners. If his bid included a provision that the government could repurchase the property on the basis of its investment value at any time, it would be different."

Ceramic Society Prepares for Atlantic City Meeting

Refractories Division Program Announced—Usual Features, Including Excursions

Plans are rapidly being completed for the annual convention of the American Ceramic Society to be held at the Hotel Traymore, Atlantic City, during the week of Feb. 4. As usual, the first day of the meeting will be devoted to a program of general interest. Tuesday and Wednesday will be given over to meetings of the seven industrial divisions: Refractories, Glass, Enamel, Heavy Clay Products, Terra Cotta, White Wares, and Art. Industrial excursions will be made during the rest of the week.

While the complete program is not yet available, that of the Refractories Division has been announced and is given in part below. In addition to the papers on problems of interest to users as well as makers of refractories, a question box has been arranged which will insure lively discussion of perplexing problems that daily confront producer and consumer.

General

A Study of the Factors Which Control Spalling in Fireclay Brick. M. C. Booze.

Thermal Studies. M. F. Beecher.

The Transfer of Heat Through Refractories and Its Determination. Paper No. 2. A. S. Watts.

Misapplication of Firebrick Tests by Consumers. R. M. Howe.

Note on the Testing of High-Alumina Refractories. R. F. Geller.

The Work of the Federal Specifications Board on Specifications for Refractories. R. F. Geller.

Discussion on Disintegration of Firebrick by Carbon Monoxide. S. M. Phelps.

Fireclays of Indiana. W. N. Logan.

Refractory Minerals of North Carolina. Dr. J. H. Pratt.

Sillimanite as a Refractory. Hewitt Wilson.

Burning Problems

The Use of Pyrometers in Burning Refractories. R. P. Brown.

Adaptation of Tunnel and Car Kilns to the Firing of Refractories. Phillip Dressler.

Three papers to be presented by the Fuel Division, Bureau of Mines: Drafts and Their Effect on Heat Distribution in Round Down-draft Kilns; The Heat Balance and Its Meaning in the Firing of Round Down-draft Kilns; A Combustion Survey in a Round Down-draft Kiln.

Report on Firing Refractories in Round Down-draft Kilns Equipped With Gates Kiln Stoker. E. E. Ayars.

Consumers' Problems

The Method of Selecting Refractories for Marine Purposes of the Navy. Lieutenant-Commander H. H. Norton.

Factors Affecting Resistance to Abrasion of Silica Lining Blocks for Coke Ovens. E. N. McGee and F. A. Harvey.

The Behavior of Refractories in Glass Melting Furnaces. Herbert Insley.

Furnace Improvements That Could Be Made With Better Firebrick. W. B. Chapman.

Colloquium on Open-Hearth Refractories. In charge of Dr. D. A. Lyon and George A. Bole, U. S. Bureau of Mines. Discussion will be opened by the following papers: Fireclay Brick for the Open Hearth; Silica Brick for the Open Hearth; Basic Brick for the Open Hearth; Operating Conditions in the Open Hearth as They Affect Refractories.

Electric Brass Furnace Refractory Situation. Dr. H. W. Gillett. Furnace designs, users and manufacturers of refractories are urged to join in an informal discussion of this paper.

Rubber Association Elects

The Rubber Association of America, meeting Jan. 7 at the Waldorf-Astoria, New York, elected seven new directors as follows:

For 1-year term expiring January, 1925, E. H. Broadwell, vice-president and general manager, Fisk Rubber Co.; J. C. Weston, president, Ajax Rubber Co., Inc.

For 3-year term expiring January, 1927, G. E. Hall, president, Boston Woven Hose & Rubber Co.; W. F. Pfeiffer, vice-president and general manager, Miller Rubber Co.; A. L. Scheuer, president, Kelly-Springfield Tire Co.; C. B. Seger, president, United States Rubber Co.; C. T. Wilson, president, Charles T. Wilson Co., Inc.

Market Conditions

Consuming Trades Increase Contract Withdrawals of Chemicals

Larger Volumes Ordered Out for Latter Half of Month Deliveries—Spot Trading Moderate During Past Week

WITH the close of inventory taking, shipping instructions have been given more freely for shipping chemicals against contracts and this side of the business is generally reported as satisfactory. Manufacturers of chemicals are carrying numerous contracts and prompt withdrawals are regarded as favorable for active consumption in the immediate future. Trading in the spot market was reported to have been lighter than in the preceding week and price changes in the interval were unimportant.

The weighted index number for the week shows a slight recession but this resulted from changes in the position of allied materials and as far as most of the heavy chemical group is concerned, present values are thought to be around low levels. Reports from different sections agree that recent advances in bleaching powder and liquid chlorine are being maintained. Caustic soda and soda ash are selling below the levels of the corresponding period last year. Bichromates were firm during the week and with the exception of some imported chemicals, the price level is on a firm basis.

Imports of fertilizer chemicals are increasing in volume which foretells more activity in the production of mixed fertilizers. Better buying for sulphate of ammonia brought about an uplift in prices during the past week. Nitrate of soda has been offered more freely and prices eased off slightly. No change has been made in the schedule of potash prices but there is a wider distribution at present against old orders.

The metal salts are influenced by fluctuations in the raw materials and strong markets are reported for lead and tin. Zinc also was firm but copper values fell away in the week's trading.

Acids

Acetic acid has maintained a steady position in accord with the market for raw materials. Competition is found in the glacial, from imported grades, and the latter continue to show a price range according to seller. A better call is reported for sulphuric acid with no real change in surrounding conditions. Nitric acid also is moving in a normal way with values steady. Formic acid maintains the recent price advance and is steady because of higher costs to import. Citric acid has been moving only in a quiet way and buying has not been stimulated by the instability of prices. Imported offerings are still on the market in good supply and sales are reported to have been made at 46c. per lb. The position of domestic acid also has been lower although no open reduction has been made in the quoted schedule of 48@49c. per lb. Tartaric acid also is dull and private terms enter into sales. Values are reported as around 26½@27c. per lb. for imported and 30c. per lb. for domestic. Demand for oxalic is for small lots and asking prices range from 12c. to 12½c. per lb. for spot holdings.

Bleaching Powder and Liquid Chlorine Steady—Sulphate of Ammonia Higher — Arsenic Dull on Spot—Acetate of Lead Firm but Unchanged — Red Phosphorus Scarce—Soda Ash Moving Freely—Bichromates Firm.

Potashes

Bichromate of Potash—A firm undertone was noted last week and prominent sellers are holding more closely to prices as graded on quantities for small lots 9¾@10c. per lb. is asked, but on large lots 9½c. per lb. can be done. Current prices are reported to be close to producing costs and the ore market is holding up in price.

Carbonate of Potash — Shipment prices for 96-98 per cent calcined are holding at 5½c. per lb. with spot material at an inside figure of 5¾c. per lb. and up to 6c. per lb. asked by some importers. Quotations for 80-85 per cent range from 5¼c. to 5¾c. per lb. according to seller and quantity.

Chlorate of Potash—More difficulty is found in securing spot chlorate at 7c. per lb. and prime goods are held at an inside price of 7¼c. per lb. in many quarters. Shipment prices are relatively high and this is steadying the quotation for spot material.

Caustic Potash—Trading in all positions was light last week and there was no change in the general situation. Holdings on spot are commanding 6¼c. per lb. and prompt shipments from abroad are offered at 6¼c. per lb.

Permanganate of Potash—The decline in domestic permanganate as announced in the previous week has attracted more attention to the home product and prices are now more favorable to the latter at certain delivered points. Imported grades are quiet but have not been pressed for sale and holders are not inclined to shade 14½c. per lb. whereas domestic permanganate is offered at 14c. per lb., at works.

Prussiate of Potash—Call for yellow prussiate was slow and the fact that spot goods are held at 22c. per lb. with shipments at 20c. per lb., causes buyers to trade in a hand-to-mouth fashion. Red prussiate was little better than nominal as inquiry was absent and trading was not sufficient to test values. Quotations are given at 44c. to 46c. per lb.

Sodas

Soda Ash—A large part of the trade is under contract and shipments from producing plants is reported to have obtained an excellent start. Some reports say the early movement this year is in excess of that for 1923. The prompt call for deliveries is holding down stocks at works. Deliveries for export also are said to be of large volume. Jobbing trade is somewhat irregular but averages up to normal. Current quotations for light ash, basis 58 per cent, are $1.25 per 100 lb. in bulk, $1.38 per 100 lb. in bags, and $1.63 per 100 lb. in bbl. These prices for carlots f.o.b. works. Dense ash is quoted at $1.35 per 100 lb. in bulk, $1.45 per 100 lb. in bags, and $1.69 per 100 lb. in bbl. Prompt shipment is held at a premium of 5c. per 100 lb. over the contract schedule.

Bichromate of Soda—Business shows indications of opening up and in spite of rather slow operations in some consuming industries, the present movement of bichromate is said to be up to normal standards. Stocks are well controlled and resale lots are not a factor in the market. Market prices are firm for prompt and nearby with 7¼@7¾c. per lb. as the asking prices.

Caustic Soda—Deliveries have not yet reached a point of great activity but are reported to be good for this time of year and have been increasing in volume. Export shipments also are said to be good and to be well distributed among foreign countries. New business is moderate but this is accounted for by the fact that most consumers are covered for the present needs. No change in prices is looked for and quotations remain at $3.10 per 100 lb. for contracts in 76 per cent caustic in

standard drums f.o.b. works. This is also the quotation f.a.s. New York on export business.

Nitrate of Soda—Shipments from Chile in December were reported to be heavy and as most of this material is sold ahead, it is evident that consumers are being largely supplied on contracts. A better call, however, was noted in the spot market and prices showed some irregularity as reports were current that $2.50 per 100 lb. had been shaded. It was also stated that some forward positions sold under $2.50 per 100 lb.

Prussiate of Soda—Very little change was noted from the previous week either in the way of price changes or of activity in trading. If anything the spot market was a little easier as it was possible to pick up goods at 11¼c. per lb., though 11½c. per lb. was the general asking price. The shipment price was maintained at 11c. per lb. but was largely nominal as buyers were not showing interest in forward positions.

Miscellaneous Chemicals

Acetate of Lime—It was reported last week that acetate of lime from Canada would be admitted free into this country. This led to some speculation regarding its probable effect on the market but competition from that quarter is not generally looked for. The domestic market is holding on an even keel with quotations unchanged at $4 per 100 lb.

Acetate of Lead—The metal market moved into new high ground during the week but leading producers of acetate of lead continued to quote on an unchanged basis of 14@14½c. per lb. for white crystals and 13@13½c. per lb. for brown, broken.

Arsenic—Another dull week was in evidence as far as spot material was concerned. Large consumers are well covered for the present and are not keen to commit themselves further until the calcium arsenate demand becomes more definite. The report on domestic production of arsenic for last year, shows the output in the last 6 months to have been under earlier estimates. The report also indicated that stocks in producers' hands were small. Offerings of imported arsenic on spot were held at 13c. per lb. but there was very little business done and the absence of speculative trading makes the market dependent on activities of consumers.

Bleaching Powder—Price cutting in this material, which was prevalent in the latter part of 1923, is no longer in evidence. First hands are adhering to the higher price schedule which went into effect the first week of the year. Second hands likewise are reported to be firmer in their views and the market in general is described as steady. Current quotations are on a basis of $1.50 per 100 lb. in standard drums, f.o.b. works. Bleach in small drums is held at $1.75 per 100 lb. at works. These prices apply to carlots with premiums asked for less carlot quantities. Liquid chlorine also is holding a steady course and prices are quoted at: $3.50 per 100 lb. in tank car lots f.o.b. works; $4.50 per 100 lb. in cylinders, carlots, at works; $5 per 100 lb. on sales of more than 1 ton f.o.b. works; $6 per 100 lb. on sales of 1 ton or less f.o.b. works.

Calcium Arsenate — There were rumors current to the effect that the market had advanced in price with a freer trading movement. These rumors were denied by some factors in the local trade who stated that interest in arsenate had increased but had not reached a point where orders for fresh supplies actually had been placed. They also asserted that market values had not advanced and repeated quotations at 11½c. per lb.

Sulphate of Ammonia—There was an improved call for sulphate with domestic and foreign orders in the market. Prices strengthened as a result and quotations were moved up to $2.90 per 100 lb. Recent trading has reduced surplus holdings and the market is in a better statistical position.

"Chem. & Met." Weighted Index of Chemical Prices

Base = 100 for 1913-14

This week	165.13
Last week	165.74
Jan., 1923	174.00
Jan., 1922	147.00
Jan., 1921	181.00
Jan., 1920	242.00
Jan., 1919	262.00
Jan., 1918	281.00

The slight reduction in the weighted index number was occasioned by sales of crude cottonseed oil at 9½c. Ammonium sulphate closed higher, but this did not offset the decline in the vegetable oil.

Alcohol

Important contract business in denatured alcohol was placed last week at unchanged prices. The undertone remains firm. Special No. 1 held at 45½c. per gal., in drums, carload basis. Completely denatured, formula No. 5, was offered at 44½c. per gal., in drums. U. S. P. ethyl spirits, 190 proof, was quotably unchanged at $4.78@$4.80 per gal., cooperage included. Offerings of methanol continued on a rather liberal scale and prices, in some quarters, were unsettled. Pure methanol, in tank cars, closed nominally at 90c. per gal. The 97 per cent grade, in bbl., held at 93c. per gal.

Coal-Tar Products

Advance in Gasoline Steadies Market for Benzene—U.S.P. Phenol on Spot Nominal—Salicylates in Firmer Position

INTEREST centered in the general improvement in the gasoline situation. Higher prices for the petroleum product resulted in a firmer market for benzene, although no revision in the trading basis took place in the past week. Leading producers reported smaller stocks and a gradual tightening in the market. Ammonium sulphate was higher in several directions, reflecting better business in the fertilizer field. Phenol on spot was in scanty supply and prices were wholly nominal, covering a wide range. Steadier prices prevailed for refined naphthalene, but the seasonal business in this commodity has not yet assumed large proportions. Aniline oil, while steady, was quotably unchanged. Demand for intermediates, taken as a whole, was fair, with no important movement in prices.

Aniline Oil and Salt—Steady buying featured the market and leading factors reported a firm tone. The oil closed nominally unchanged at 16@17c. per lb., drums, extra. Aniline salt was offered at 22@23c. per lb.

Benzene—Improvement in demand and higher prices for gasoline strengthened the market in more than one direction. The general trading basis held at 21c. per gal., tanks, works, on the 90 per cent grade. Official statistics indicate that the United Kingdom exported 1,780,970 gal. of benzene in the 11 months ended Nov. 30, which compares with 62,727 gal. for the corresponding period a year ago.

Creosote — Domestic production is sold up and consumers have been heavy buyers abroad. Exports of tar and creosote oil from the United Kingdom for the 11 months ended Nov. 30 amounted to 44,253,480 gal., which compares with 24,182,451 gal. in the same period a year ago.

Naphthalene—Anticipating improvement in business, operators in refined naphthalene entertained firmer views. Leading producers have disposed of their output around 6c. per lb. on white flake. Prompt and nearby material at the close held at 6¼@6½c. on flake and 7@7½c. on ball. Chips closed nominally at 5½@5¾c. per lb. Crude to import was steady at 2⅛@2⅜c. per lb., c.i.f. New York. Exports of naphthalene from the United Kingdom in the 11 months ended Nov. 30 amounted to 189,215 cwt. (112 lb.), comparing with 34,867 cwt. for the corresponding period in 1922.

Phenol—Spot offerings were meager and prices were wholly nominal, ranging from 35@37c. per lb., in drums. Producers quote 26@28c. on contract, but appear well sold up. Several factors in U.S.P. phenol are taking care of regular trade at 29c. per lb., in drums, nearby delivery. Demand was good.

Xylene—Offerings were plentiful and prices were barely steady on all grades. Pure xylene, in drums, closed at 45@50c. per gal., as to quantity and delivery. The commercial grade, in tank cars, works, held at 27@28c. per gal.

Vegetable Oils and Fats

Crude Cottonseed Slightly Lower—Heavy Buying of Tallow—Coconut Advances on Pacific Coast—Rapeseed Oil Higher

SOAP makers entered the market for tallow and took on round lots at practically unchanged prices. Trading in coconut oil was not so active, but an advance in copra strengthened the views of sellers, especially on the Pacific coast. Some selling pressure was reported in china wood oil. Linseed oil did not move much one way or the other, with sentiment generally bearish. Palm oils were firm on limited offerings. Crude cottonseed was offered more freely in the South.

Cottonseed Oil — Taking the stand that high prices will curtail consumption local operators in cottonseed oil were not inclined to favor the long side of the market, but no real pressure developed, and net changes for the week were rather unimportant. The unsettlement in cotton eased the crude situation a little, final prices being ½c. per lb. lower. Crude oil sold at 9⅝c. in the Southeast and at 9½c. in Texas, tank car basis, f.o.b. mills. Actual consumption of refined oil for the first 5 months of the season is almost 180,000 bbl. less than for the corresponding period a year ago. Demand for lard compound was quiet and prices at the close were unsettled and barely steady at 13@13½c. per lb., carload basis. Easier lard prices in Chicago had some influence upon the options in the oil market. Stocks of lard in Chicago on Jan. 15 were estimated at 9,591,901 lb., comparing with 8,339,144 lb. on Jan. 1. The moderate gain was disappointing and was explained by the heavy export movement which took place early in the year.

Linseed Oil — With no important change in the seed situation the market for linseed oil ruled steady. Demand was described as routine only. Carload business calling for March delivery went through at 89c. per gal., cooperage basis. Spot oil held at 91c. asked. April oil closed nominally at 88c. per gal., with May forward at 85@86c. per gal., cooperage basis. With a larger yield in the Argentine and a normal crop of linseed in India operators refused to contract far ahead at current prices. Even crushers favored the bear side of the market for summer oil, notwithstanding the bright outlook for business covering the spring painting season. Argentine shipments of seed since the first of the year are larger than a year ago. Receipts of seed at Minneapolis and Duluth (domestic seed) from Sept. 1 to date amounted to 12,650,000 bu. The cake market was quiet at $41 per ton, f.a.s. New York.

China Wood Oil—Prices at the close were unsettled and generally lower. Sales on the coast went through at 19½c. per gal., tank car basis. Nearby oil sold at 18¾c. tank car basis, New York, according to reports. Pressure from speculators was a factor. The market in the Orient held fairly steady.

Coconut Oil — Demand was not so active, yet offerings were moderate and higher prices prevailed, especially on the Pacific coast. Actual business, involving more than 10 cars of Ceylon type oil, was put through at 8½c. per lb., tanks, f.o.b. coast, nearby delivery. The New York market settled at 8¾@9c. per lb., tank car basis. Copra sold at 6c. per lb., Atlantic seaboard.

Corn Oil—Last sales went through at 10c. per lb., tank cars, Chicago, with the market firm.

Olive Oil Foots—Cables from Italy reported steady prices on prime green material, c.i.f. offerings holding around 9½c. per lb., New York.

Palm Oil—Stocks are light and in firm hands. Leading operators say that 52,000 tons of palm oil were imported in the past year. Lagos closed at 8c., nominal, with Niger at 7.15c. per lb., c.i.f. basis.

Other Vegetable Oils—Palm kernel oil sold at 8⅜c. per lb., in casks, c.i.f. New York. There were offerings at 9½c. per lb., in bbl., forward delivery. Refined rapeseed oil on spot advanced to 82c. per gal., with futures at 82@83c. per gal. Crude soya held at 10c. per lb., sellers' tanks, duty paid, Pacific coast ports.

Tallow, etc. — It is estimated that 2,000,000 lb. of extra special tallow sold at 8⅜c. per lb., ex-plant, reflecting a rather firm situation in this material. A week ago a small lot did bring 8½c. per lb., but large buyers refused to accept this price as representing the market. Oleo stearine held at 10c. per lb., nominal. Cold pressed neatsfoot oil sold at $1.33 per gal.

Miscellaneous Materials

Antimony—The market closed ½c. per lb. higher. Chinese and Japanese brands, 10½@10⅝c. W.C.C. brand, 11½@12c. Cookson's "C" grade, 11½@12c. Chinese needle antimony, lump, nominal, 7½@8½c. per lb. Standard powdered needle antimony (200 mesh), 8@9c. per lb. White antimony oxide, chinese, guaranteed 99 per cent, 8@8½c.

Barytes — Demand from lithopone makers did not improve and this tends to ease the situation in some quarters. White floated held at $26@$28 per ton, carload basis, f.o.b. St. Louis. Crude steady at $8.50 per ton, f.o.b. mines.

Blanc Fixe—Offerings continued at 4@4½c. per lb. on the dry, in bbl., the inside figure obtaining on carload business. Demand was fair.

Casein—Imported was available at 12@12½c. per lb. The Argentine market held steady and this supported prices locally in the face of rather slow trading. Domestic material held at 12½@13c. per lb.

Glycerine—Chemically pure glycerine was offered at 16½c. per lb., carload basis, immediate shipment, indicating that the market underwent little change in the past week. Dynamite was offered at 15½c. per lb. in the middle west, with a possibility of shading the market on a firm bid. In fact recent business did go through at 15c. per lb. Soap lye crude, basis 80 per cent, was offered at 10¾c. per lb., loose, carload lots. Saponification, basis 88 per cent, closed nominally at 11¾c. per lb.

Naval Stores — Demand slackened and prices eased a little, spirits closing at $1.02 per gal., in bbl. Rosins held firm under steady buying the lower grades settling at $5.85@$5.95 per bbl. Export demand was inactive.

Shellac—Trading quiet and with exchange lower prices covering forward material were barely steady. T. N. closed at 60@61c. per lb. Bleached, bonedry, settled at 71@72c. per lb.

White Lead, Etc. — The unabated strength in the metal caused prices for the different lead pigments to hold firm at the recent advance. Demand for white lead was good. Standard dry white lead, in casks, was offered by leading producers at 9½c. per lb. The sulphate was unchanged at 9c. per lb. Red lead, dry, was maintained at 11.15c. per lb., in casks, with litharge at 10.65c. per lb. Orange mineral was offered at 15½c. per lb. Pig lead held at 7.90c. per lb., with little available at this figure, outside interests asking 8c. per lb. in all instances.

Zinc Oxide—No important change occurred in the metal. Stocks of spelter on Dec. 31 were placed at 36,578 tons, against 30,904 tons on Nov. 30. Trading in zinc oxide was fair, but offerings were liberal on the selling basis established a short time ago. American process, lead free, held at 6¾c. per lb., in bags, carload lots.

Vegetable Oil Exports From United Kingdom

Exports of vegetable oils from the United Kingdom for the 11 months ended Nov. 30, 1923, with a comparison, were as follows:

	1923	1922
Castor, tons	3,612	3,980
Cottonseed, crude, tons	8,473	931
Linseed, tons	36,235	57,995
Palm, tons	*15,865	*18,217
Palm kernel, tons	19,391	6,789
Rapeseed, tons	7,335	4,602
Soya bean, tons	6,555	7,278
Cottonseed, crude, tons	1,042	238
Cottonseed, refined, tons	9,761	8,473

* Includes re-exports.

Hearst Reported Seeking Small Canadian Mill

William R. Hearst is said to be seeking control by outright purchase of one of the smaller eastern Canadian pulp mills together with large tracts of pulpwood lands. The Hearst group is believed to contemplate the erection of a small paper mill in eastern Canada near the pulp and wood.

Current Prices in the New York Market

For Chemicals, Oils and Allied Products

THESE prices are for the spot market in New York City, but a special effort has been made to report American manufacturers' quotations whenever available. In many cases these are for material f.o.b. works or on a contract basis and these prices are so designated. Quotations on imported stocks are reported when they are of sufficient importance to have a material effect on the market. Prices quoted in these columns apply to large quantities in original packages.

General Chemicals

Acetone, drums	lb.	$0.25 –	$0.25½
Acetic anhydride, 85%, dr.	lb.	.38 –	....
Acid, acetic, 28%, bbl.	100 lb.	3.38 –	3.63
Acetic, 56%, bbl.	100 lb.	6.75 –	7.00
Acetic, 80%, bbl.	100 lb.	9.58 –	9.83
Glacial, 99½%, bbl.	100 lb.	12.00 –	12.78
Boric, bbl.	lb.	.10 –	....
Citric, kegs	lb.	.46½ –	.48
Formic, 85%	lb.	.12½ –	.13
Gallic, tech.	lb.	.45 –	.50
Hydrofluoric, 52%, carboys	lb.	.11 –	.12
Lactic, 44%, tech., light, bbl.	lb.	.11½ –	.12
22% tech., light, bbl.	lb.	.05½ –	.06
Muriatic, 18° tanks	100 lb.	.90 –	1.00
Muriatic, 20°, tanks	100 lb.	1.00 –	1.10
Nitric, 36°, carboys	lb.	.04½ –	.05
Nitric, 42°, carboys	lb.	.05½ –	.05½
Oleum, 20%, tanks	ton	18.50 –	19.00
Oxalic, crystals, bbl.	lb.	.11½ –	.12½
Phosphoric, 50% carboys	lb.	.07½ –	.08½
Pyrogallic, resublimed	lb.	1.50 –	1.60
Sulphuric, 60°, tanks	ton	9.00 –	11.00
Sulphuric, 60°, drums	ton	13.00 –	14.00
Sulphuric, 66°, tanks	ton	15.00 –	16.00
Sulphuric, 66° drums	ton	20.00 –	21.00
Tannic, U.S.P., bbl.	lb.	.65 –	.70
Tannic, tech., bbl.	lb.	.45 –	.50
Tartaric, imp., powd., bbl.	lb.	.26½ –	.27
Tartaric, domestic, bbl.	lb.	.30 –	....
Tungstic, per lb.	lb.	1.20 –	1.25
Alcohol, butyl, drums, f.o.b. works	lb.	.26 –	.28
Alcohol ethyl (Cologne spirit), bbl.	gal.	4.81 –	....
Ethyl, 190 p'f. U.S.P., bbl.	gal.	4.78 –	....
Alcohol, methyl (see Methanol)			
Alcohol, denatured, 190 proof			
No. 1, special bbl.	gal.	.51½ –	...
No. 1, 190 proof, special, dr.	gal.	.45½ –	...
No. 1, 188 proof, bbl.	gal.	.52½ –	...
No. 1, 188 proof, dr.	gal.	.48½ –	...
No. 5, 188 proof, bbl.	gal.	.50½ –	...
No. 5, 188 proof, dr.	gal.	.44½ –	...
Alum, ammonia, lump, bbl.	lb.	.03½ –	.04
Potash, lump, bbl.	lb.	.03 –	.03½
Chrome, lump, potash, bbl.	lb.	.05½ –	.06
Aluminum sulphate, com., bags	100 lb.	1.40 –	1.50
Iron free bags	lb.	2.40 –	2.50
Aqua ammonia, 26°, drums	lb.	.07 –	.07½
Ammonia, anhydrous, cyl.	lb	.30 –	.30½
Ammonium carbonate, powd. tech., casks	lb.	.09 –	.09½
Ammonium nitrate, tech., casks	lb.	.09 –	.10
Amyl acetate tech., drums	gal.	4.50 –	4.75
Antimony oxide, white, bbl.	lb.	.08 –	.08½
Arsenic, white, powd., bbl.	lb.	.13 –	.13½
Arsenic, red, powd., kegs	lb.	.15 –	.15½
Barium carbonate, bbl.	ton	66.00 –	68.00
Barium chloride, bbl.	ton	84.00 –	90.00
Barium dioxide, 88%, drums	lb.	.17½ –	.18
Barium nitrate, casks		.07½ –	.08
Blanc fixe, dry, bbl.	lb.	.04 –	.04½
Bleaching powder, f.o.b. wks., drums	100 lb.	1.50 –	....
Spot N. Y. drums	100 lb.	1.75 –	2.00
Borax, bbl.	lb.	.05½ –	.05½
Bromine, cases	lb.	.28 –	.30
Calcium acetate, bags	100 lb.	4.00 –	4.05
Calcium arsenate, dr.	lb.	.11½ –	.12
Calcium carbide, drums	lb.	.05 –	.05½
Calcium chloride, fused, dr. wks.	ton	21.00 –	....
Gran. drums works	ton	27.00 –	....
Calcium phosphate, mono, bbl.	lb.	.06½ –	.07
Camphor, cases	lb.	.84 –	.85
Carbon bisulphide, drums	lb.	.06 –	.06½
Carbon tetrachloride, drums	lb.	.09 –	.09½
Chalk, precip.—domestic, light, bbl.	lb.	.04½ –	.04½
Domestic, heavy, bbl.	lb.	.03½ –	.04
Imported, light, bbl.	lb.	.04½ –	.05
Chlorine, liquid, tanks, wks.	lb.	.04 –	.04½
Contract, tanks, wks.	lb.	.03½ –	....
Cylinders, 100 lb., wks.	lb.	.05½ –	.06
Cylinders, 100 lb., spot	lb.	.08½ –	.09
Chloroform, tech., drums	lb.	.30 –	.32
Cobalt, oxide, bbl.	lb.	2.10 –	2.25
Copperas, bulk, f.o.b. wks.	ton	16.00 –	18.00
Copper carbonate, bbl.	lb.	.18 –	.19
Copper cyanide, drums	lb.	.47 –	.50
Copper sulphate, dom., bbl., 100 lb.		4.75 –	4.90
Imp bbl.	100 lb.	4.37½ –	4.50
Cream of tartar, bbl.	lb.	.22½ –	.25½
Epsom salt, dom., tech., bbl.	100 lb.	1.75 –	2.00
Epsom salt, imp., tech., bags	100 lb.	1.00 –	1.05
Epsom salt, U.S.P., dom., bbl.	100 lb.	2.25 –	2.50
Ether, U.S.P., resale, dr.	lb.	.13 –	.15
Ethyl acetate, 85%, drums	gal.	1.07 –	....
Ethyl acetate, 99%, dr.	gal.	$1.22 –	....
Formaldehyde, 40%, bbl.	lb.	10½ –	$0.11
Fullers earth—f.o.b. mines	ton	18.00 –	20.00
Furfurol, works, bbl.	lb.	.25 –	....
Fusel oil, ref., drums	gal.	.... –	....
Fusel oil, crude, drums	gal.	4.00 –	4.25
Glaubers salt, wks., bags	100 lb.	1.20 –	1.40
Glaubers salt, imp., bags	100 lb.	.90 –	.95
Glycerine, e.p., drums extra	lb.	.16½ –	.17
Glycerine, dynamite, drums	lb.	.16 –	....
Glycerine, crude 80%, loose	lb.	.10½ –	....
Hexamethylene, drums	lb.	.70 –	.75
Lead:			
White, basic carbonate, dry, casks	lb.	.09½ –	....
White, basic sulphate, casks	lb.	.09 –	....
White, in oil, kegs	lb.	.11½ –	.11½
Red, dry, casks	lb.	.11½ –	.11½
Red, in oil, kegs	lb.	.13½ –	.14½
Lead acetate, white crys., bbl.	lb.	.14 –	.14½
Brown, broken, casks	lb.	.13 –	.13½
Lead arsenate, powd., bbl.	lb.	.18 –	.20
Lime-Hydrated, bg. wks.	ton	10.50 –	12.50
Bbl., wks.	ton	18.00 –	19.00
Lime, Lump, bbl.	280 lb.	3.63 –	3.65
Litharge, comm., casks	lb.	.10½ –	.10½
Lithopone, bags	lb.	.06½ –	.06½
in bbl.	lb.	.06½ –	.06½
Magnesium carb., tech., bags	lb.	.08½ –	.08½
Methanol, 95%, bbl.	gal.	.93 –	....
Methanol, 97%, bbl.	gal.	.95 –	....
Methanol, pure, tanks	gal.	.90 –	....
drums	gal.	1.00 –	....
bbl.	gal.	1.05 –	....
Methyl-acetone, t'ks.	gal.	1.15 –	....
Nickel salt, double, bbl.	lb.	.10 –	.10½
Nickel salts, single, bbl.	lb.	.11 –	.11½
Phosgene		.60 –	.75
Phosphorus, red, cases	lb.	.... –	....
Phosphorus, yellow, cases	lb.	.35 –	.40
Potassium bichromate, casks	lb.	.09½ –	....
Potassium bromide, gran., bbl.	lb.	.19 –	.20
Potassium carbonate, 80-85%, calcined, casks	lb.	.06½ –	.06½
Potassium chlorate, powd.	lb.	.07½ –	.08½
Potassium cyanide, drums	lb.	.47 –	.52
Potassium, first sorts, cask	lb.	.08½ –	.08½
Potassium hydroxide (caustic potash) drums	lb.	.06½ –	.06½
Potassium iodide, cases	lb.	3.65 –	3.75
Potassium nitrate, bbl.	lb.	.07½ –	.09
Potassium permanganate, drums	lb.	.14 –	.14½
Potassium prussiate, red, casks	lb.	.45 –	.48
Potassium prussiate, yellow, casks	lb.	.22 –	.22½
Salammoniac, white, gran., casks, imported	lb.	.06½ –	.06¾
Salammoniac, white, gran., bbl., domestic	lb.	.07½ –	.07½
Gray, gran., casks	lb.	.08 –	.09
Salsoda, bbl.	100 lb.	1.20	1.40
Salt cake (bulk)	ton	22.00 –	24.00
Soda ash, light, 58% flat, bulk, contract	100 lb.	1.25 –	....
bags, contract	100 lb.	1.38 –	....
Soda ash, dense, bulk, contract, basis 58%	100 lb.	1.35 –	....
bags, contract	100 lb.	1.45 –	....
Soda, caustic, 76%, solid, drums contract	100 lb.	3.10 –	....
Soda, caustic, ground and flake, contracts, dr.	100 lb.	3.50 –	3.85
Soda, caustic, solid, 76% f. a.s. N. Y.	100 lb.	3.10 –	....
Sodium acetate, works, bbl.	lb.	.05 –	.05½
Sodium bicarbonate, bulk	100 lb.	1.75 –	....
330-lb. bbl.	100 lb.	2.00 –	....
Sodium bichromate, casks	lb.	.07½ –	.07½
Sodium bisulphate (niter cake)	ton	6.00 –	7.00
Sodium bisulphite, powd., U.S.P., bbl.	lb.	.04½ –	.04½
Sodium chlorate, kegs	lb.	.06½ –	.07
Sodium chloride	long ton	12.00 –	13.00
Sodium cyanide, cases	lb.	.19 –	.22
Sodium fluoride, bbl.	lb.	$0.08½ –	$0.10½
Sodium hyposulphite, bbl.	lb.	.02½ –	.02½
Sodium nitrite, casks	lb.	.07½ –	.07½
Sodium peroxide, powd., cases	lb.	.28 –	.30
Sodium phosphate, dibasic, bbl.	lb.	.03½ –	.04
Sodium prussiate, yel. drums	lb.	.11 –	.11½
Sodium salicylic, drums	lb.	.40 –	.42
Sodium silicate (40°, drums)	100 lb.	.75 –	1.15
Sodium silicate (60°, drums)	100 lb.	1.75 –	2.00
Sodium sulphide, fused, 60-62% drums	lb.	.03 –	.03½
Sodium sulphite, crys., bbl.	lb.	.03½ –	.03½
Strontium nitrate, powd., bbl.	lb.	.11½ –	.12
Sulphur chloride, yel drums	lb.	.04½ –	.05
Sulphur, crude	ton	18.00 –	20.00
At mine, bulk	ton	16.00 –	18.00
Sulphur, flour, bag	100 lb.	2.25 –	2.35
Sulphur, roll, bag	100 lb.	2.00 –	2.10
Sulphur dioxide, liquid, cyl.	lb.	.08 –	.08
Tin bichloride, bbl.	lb.	.13½ –	.13½
Tin oxide, bbl.	lb.	.51 –	....
Tin crystals, bbl.	lb.	.34½ –	.35
Zinc carbonate, bags	lb.	.14 –	.14½
Zinc chloride, gran, bbl.	lb.	.06½ –	.06½
Zinc cyanide, drums	lb.	.37 –	.38
Zinc oxide, , lead free, bag	lb.	.06½ –	.06½
5% lead sulphate, bags	lb.	.06½ –	.07½
10 to 35 % lead sulphate, bags	lb.	.06½ –	.06½
French, red seal, bags	lb.	.09½ –	....
French, green seal, bags	lb.	.10½ –	....
French, white seal, bbl.	lb.	.12 –	....
Zinc sulphate, bbl.	100 lb.	2.75 –	3.25

Coal-Tar Products

Alpha-naphthol, crude, bbl.	lb.	$0.60 –	$0.70
Alpha-naphthol, ref., bbl.	lb.	.65 –	.80
Alpha-naphthylamine, bbl.	lb.	.35 –	.36
Aniline oil, drums	lb.	.16 –	.16½
Aniline salts, bbl.	lb.	.22 –	.23
Anthracene, 80%, drums	lb.	.75 –	.80
Anthracene, 80%, imp., drums, duty paid	lb.	.65 –	.70
Anthraquinone, 25%, paste, drums	lb.	.75 –	.80
Benzaldehyde U.S.P., carboys	lb.	1.50 –	....
f.f.c. drums	lb.	1.60 –	....
tech, drums	lb.	75	....
Benzene, pure, water-white, tanks, works	gal.	.23 –	....
Benzene, 90%, tanks, works	gal.	.21 –	....
Benzidine base, bbl.	lb.	.80 –	.84
Benzidine sulphate, bbl.	lb.	.72 –	.75
Benzoic acid, U.S.P., kegs	lb.	.85 –	88
Benzoate of soda, U.S.P., bbl.	lb.	.65 –	.70
Benzyl chloride, 95-97%, ref., carboys	lb.	.40 –	....
Benzyl chloride, tech., drums	lb.	.25 –	....
Beta-naphthol, tech., bbl.	lb.	.24 –	.25
Beta-naphthylamine, tech.	lb.	.75 –	.80
Cresol, U.S.P., drums	lb.	.25 –	.29
Ortho-cresol, drums	lb.	.28 –	.32
Cresylic acid, 97%, works drums	gal.	.75 –	.85
95-97%, drums, works	gal.	.70 –	.75
Dichlorbenzene, drums	lb.	.06 –	.08
Diethylaniline, drums	lb.	.49 –	.51
Dimethylaniline, drums	lb.	.38 –	.39
Dinitrobenzene, bbl.	lb.	.18 –	.20
Dinitrochlorbenzene, bbl.	lb.	.21 –	.22
Dinitronaphthalen, bbl.	lb.	.30 –	.32
Dinitrophenol, bbl.	lb.	.35 –	.40
Dinitrotoluen, bbl.	lb.	.20 –	.22
Dip oil, 25%, drums	gal.	.30 –	.35
Diphenylamine, bbl.	lb.	.50 –	.52
H-acid, bbl.	lb.	.75 –	.80
Meta-phenylenediamine, bbl.	lb.	1.00 –	1.05
Michlers ketone, bbl.	lb.	3.00 –	3.50
Monochlorbenzene, drums	lb.	.08 –	.10
Monoethylaniline, drums	lb.	.95 –	1.10
Naphthalene, flake, bbl.	lb.	.06½ –	.06½
Naphthalene, balls, bbl.	lb.	.07 –	.07½
Naphthionate of soda, bbl.	lb.	.60 –	.65
Naphthionic acid, crude, bbl.	lb.	.55 –	.60
Nitrobenzene, drums	lb.	.09 –	.09½
Nitro-naphthalene, bbl.	lb.	.30 –	.35
Nitro-toluene, drums	lb.	.13½ –	.14
N-W acid, bbl.	lb.	1.10 –	1.15
Ortho-amidophenol, kegs	lb.	2.30 –	2.35
Ortho-dichlorbenzene, drums	lb.	.15 –	.17
Ortho-nitrophenol, bbl.	lb.	1.20 –	1.30
Ortho-nitrotoluene, drums	lb.	.11 –	.12
Ortho-toluidine, bbl.	lb.	.14 –	.16
Para-amiñophenol, base, kegs	lb.	1.30 –	....
Para-amiñophenol, HCl, kegs	lb.	1.55 –	....
Para-dichlorbenzene, bbl.	lb.	.17 –	.20
Paranitroaniline, bbl.	lb.	.70 –	.73
Para-nitrotoluene, bbl.	lb.	.60 –	.65
Para-phenylenediamine, bbl.	lb.	1.45 –	1.50
Para-toluidine, bbl	lb.	.90 –	.95
Phthalic anhydride, bbl.	lb.	.30 –	.34
Phenol, U.S.P., dr.	lb.	.26 –	.27
Picric acid, bbl.	lb.	.20 –	.22
Pyridine, dom., drums	gal.	nominal	
Pyridine, imp., drums	gal.	4.00 –	4.25
Resorcinol, tech., kegs	lb.	1.40 –	1.50

Resorcinol, pure, kegs	lb.	$2.15 –	....
R-salt, bbl.	lb.	.55 –	.60
Salicylic acid, tech., bbl.	lb.	.33 –	....
Salicylic acid, U.SP., bbl.	lb.	.35 –	....
Solvent naphtha, water-white, tanks	gal.	.23 –	....
Crude, tanks	gal.	.20 –	....
Sulphanilic acid, crude, bbl.	lb.	.18 –	.20
Thiocarbanilide, kegs	lb.	.35 –	.38
Tolidine, bbl.	lb.	1.00 –	1.05
Toluidine, mixed, kegs	lb.	.30 –	.35
Toluene, tank cars, works	gal.	.24 –	....
Toluene, drums, works	gal.	.29 –	....
Xylidine, drums	lb.	.50 –	....
Xylene, pure, drums	gal.	.45 –	.50
Xylene, com., drums	gal.	.32 –	.34
Xylene, com., tanks	gal.	.27 –	.29

Naval Stores

Rosin B-D, bbl. 280 lb.		$5.85 –	.....
Rosin E-I, bbl. 280 lb.		5.90 –	.....
Rosin K-N, bbl. 280 lb.		6.25 –	$6.75
Rosin W.G.-W.W., bbl. 280 lb.		7.65 –	7.85
Wood rosin, bbl. 280 lb.		5.80 –	5.90
Turpentine, spirits of, bbl.	gal.	1.02 –	1.03
Wood, steam dist., bbl.	gal.	.88 –	.....
Wood, dest. dist., bbl.	gal.	.72 –	.....
Pine tar pitch, bbl. 200 lb.		5.50 –	.....
Tar, kiln burned, bbl. 500 lb.		11.00 –	.....
Retort tar, bbl. 500 lb.		11.00 –	.....
Rosin oil, first run, bbl.	gal.	.45 –	.....
Rosin oil, second run, bbl.	gal.	.47 –	.....
Rosin oil, third run, bbl.	gal.	.50 –	.....
Pine oil, steam dist.	gal.	.65 –	.....
Pine oil, pure, dest. dist.	gal.	.60 –	.....
Pine tar oil, ref.	gal.	.48 –	.....
Pine tar oil, crude, tanks f.o.b. Jacksonville, Fla.	gal.	.32 –	.32½
Pine tar oil, double ref., bbl.	gal.	..... –	.75
Pine tar, ref., thin, bbl.	gal.	..... –	.25
Pinewood creosote, ref., bbl.	gal.	..... –	.52

Animal Oils and Fats

Degras, bbl.	lb.	$0.04 –	$0.04½
Grease, yellow, loose	lb.	.07½ –	.07¾
Lard oil, Extra No. 1, bbl.	gal.	.85 –	.....
Neatsfootoil 20 deg. bbl.	gal.	1.33 –	.....
No. 1, bbl.	gal.	1.00 –	.....
Oleo Stearine		.10 –	.....
Oleo oil, No. 1, bbl.	lb.	.16 –	.....
Red oil, distilled, d.p. bbl.	lb.	.09½ –	.09¾
Saponified, bbl.	lb.	.09½ –	.09¾
Tallow, extra, loose	lb.	.08¾ –	.....
Tallow oil, acidless, bbl.	gal.	.86 –	.88

Vegetable Oils

Castor oil, No. 3, bbl.	lb.	$0.14½ –	.....
Castor oil, No. 1, bbl.	lb.	.15 –	.....
Chinawood oil, bbl.	lb.	.20½ –	.21
Coconut oil, Ceylon, bbl.	lb.	.10¾ –	.10½
Ceylon, tanks, N.Y.	lb.	.08½ –	.....
Coconut oil, Cochin, bbl.	lb.	.10½ –	.10¾
Corn oil, crude, bbl.	lb.	.12 –	.....
Crude, tanks, (f.o.b. mill)	lb.	.10 –	.....
Cottonseed oil, crude (f.o.b. mill), tanks	lb.	.09½ –	.09¾
Summer yellow, bbl.	lb.	.11½ –	.12
Winter yellow, bbl.	lb.	.12½ –	.13
Linseed oil, raw, car lots, bbl.	gal.	.91 –	.....
Raw, tank cars (dom.)	gal.	.85 –	.....
Boiled, cars, bbl. (dom.)	gal.	.93 –	.....
Olive oil, denatured, bbl.	gal.	1.10 –	1.12
Sulphur, (foots) bbl.	lb.	.09¼ –	.....
Palm, Lagos, casks	lb.	.08 –	.....
Niger, casks	lb.	.07½ –	.07¾
Palm kernel, bbl.	lb.	.09½ –	....
Peanut oil, crude, tanks (mill)	lb	.12 –	....
Peanut oil, refined, bbl.	lb.	.15 –	.15½
Perilla, bbl	lb.	.14½ –	.14¾
Rapeseed oil, refined, bbl.	gal.	.82 –	....
Rapeseed oil, blown, bbl.	gal.	.85 –	.86
Sesame, bbl.	lb.	.12½ –	.13
Soya bean (Manchurian), bbl.	lb.	.... –	.....
Tank, f.o.b. Pacific coast	lb.	.10 –	.....
Tank, (f.o.b. N.Y.)	lb.	.10½ –	.....

Fish Oils

Cod, Newfoundland, bbl.	gal.	$0.68 –	.....
Menhaden, light pressed, bbl.	gal.	.65 –	.....
White bleached, bbl.	gal.	.67 –	.....
Blown, bbl.	gal.	.71 –	.....
Crude, tanks (f.o.b. factory)	gal.	.47½ –	.....
Whale No. 1 crude, tanks, coast	lb.	..... –	.....
Winter, natural, bbl.	gal.	.75 –	.76
Winter, bleached, bbl.	gal.	.78 –	.79

Oil Cake and Meal

Coconut cake, bags	ton	$34.00 –	....
Cottonseed meal, f.o.b. mills	ton	45.00 –	....
Linseed cake, bags	ton	41.00 –	....
Linseed meal, bags	ton	44.00 –	....

Dye & Tanning Materials

Albumen, blood, bbl.	lb.	$0.45 –	$0.50
Albumen, egg, tech, kegs	lb.	.95 –	.97
Cochneal, bags	lb.	.32 –	.34
Cutch, Borneo, bales	lb.	.04½ –	.04¾
Cutch, Rangoon, bales	lb.	.14½ –	.15
Dextrine, corn, bags 100	lb.	3.59 –	3.69
Dextrine, gum, bags 100	lb.	3.89 –	3.99
Divi-divi, bags	ton	38.00 –	39.00
Fustic, sticks	ton	30.00 –	35.00
Fustic, chips, bags	lb.	.04 –	.05
Gambier com., bags	lb.	.10½ –	.10¾
Logwood, sticks	ton	25.00 –	26.00
Logwood, chips, bags	lb.	.02½ –	.03
Sumac, leaves, Sicily, bags	ton	90.00 –	.....
Sumac, gruond, bags	ton	$85.00 –	$90.00
Sumac, domestic, bags	ton	40.00 –	42.00
Starch, corn, bags 100	lb.	3.02 –	3.12
Tapioca flour, bags	lb.	.06 –	.07

Extracts

Archil, conc., bbl.	lb.	$0.16½ –	$0.20
Chestnut, 25% tannin, tanks	lb.	.02 –	.03
Divi-divi, 25% tannin, bbl.	lb.	.04 –	.05
Fustic, crystals, bbl.	lb.	.20 –	.22
Fustic, liquid, 42°, bbl.	lb.	.08 –	.09
Gambier, liq., 25% tannin, bbl.	lb.	.09 –	.09½
Hematine crys., bbl.	lb.	.14 –	.18
Hemlock, 25% tannin, bbl.	lb.	.03½ –	.04
Hypernic, solid, drums	lb.	.24 –	.26
Hypernic, liquid, 51°, bbl.	lb.	.09½ –	.10½
Logwood, crys., bbl.	lb.	.14 –	.15
Logwood, liq., 51°, bbl.	lb.	.08 –	.09
Quebracho, solid, 65% tannin, bbl.	lb.	.05 –	.05½
Sumac, dom., 51°, bbl.	lb.	.06½ –	.07½

Dry Colors

Blacks–Carbongas, bags, f.o.b. works, contract	lb.	$0.06½ –	$0.08½
spot, cases	lb.	.10½ –	.14½
Lampblack, bbl.	lb.	.12 –	.40
Mineral, bulk	ton	35.00 –	45.00
Blues–Bronze, bbl.	lb.	.42 –	.45
Prussian, bbl.	lb.	.42 –	.45
Ultramarine, bbl.	lb.	.08 –	.35
Browns, Sienna, Ital., bbl.	lb.	.06 –	.14
Sienna, Domestic, bbl.	lb.	.03½ –	.04
Umber, Turkey, bbl.	lb.	.04 –	.04½
Greens–Chrome, C.P.Light, bbl.	lb.	.28 –	.30
Chrome, commercial, bbl.	lb.	.12 –	.12½
Paris, bulk	lb.	.26 –	.28
Reds, Carmine No. 40, tins	lb.	4.50 –	4.70
Iron oxide red, casks	lb.	.10 –	.16
Para toner, kegs	lb.	1.00 –	1.10
Vermilion, English, bbl.	lb.	1.15 –	1.20
Yellow, Chrome, C.P. bbls.	lb.	.17½ –	.18
Ocher, French, casks	lb.	.02½ –	.03

Waxes

Bayberry, bbl.	lb.	$0.25 –	$0.26
Beeswax, crude, Afr. bg.	lb.	.22 –	....
Beeswax, refined, light, bags	lb.	.32 –	.34
Beeswax, pure white, cases	lb.	.40 –	.41
Candellila, bags	lb.	.23 –	.23½
Carnauba, No. 1, bags	lb.	.36 –	.38
No. 2, North Country, bags	lb.	.21 –	.21½
No. 3, North Country, bags	lb.	.18½ –	.19
Japan, cases	lb.	.17½ –	.18
Montan, crude, bags	lb.	.05½ –	.06
Paraffine, crude, match, 105-110 m.p., bbl.	lb.	.04½ –	....
Crude, scale 124-126 m.p. bags	lb.	.03½ –	.03¾
Ref., 118-120 m.p., bags	lb.	.04 –	....
Ref., 125 m.p., bags	lb.	.05 –	....
Ref, 128-130 m.p., bags	lb.	.04½ –	.....
Ref., 133-135 m.p., bags	lb.	.05 –	.05½
Ref., 135-137 m.p., bags	lb.	.05½ –	....
Stearic acid, agle pressed, bags	lb.	.11½ –	.11¾
Double pressed, bags	lb.	.12 –	.12½
Triple pressed, bags	lb.	.13 –	.13½

Fertilizers

Acid phosphate, 16%, bulk, works	ton	$8.00 –	$8.25
Ammonium sulphate, bulk f.o.b. works 100	lb.	2.95 –	3.00
Blood, dried, bulk	unit	4.10 –	4.15
Bone, raw, 3 and 50, ground	ton	26.00 –	28.00
Fish scrap, dom., dried, wks.	unit	4.40 –	.....
Nitrate of soda, bags 100	lb.	2.47½ –	2.50
Tankage, high grade, f.o.b. Chicago	unit	3.25 –	3.35
Phosphate rock, f.o.b. mines			
Florida pebble, 68-72%.	ton	4.00 –	4.50
Tennessee, 78-80%.	ton	7.75 –	8.00
Potassium muriate, 80%, bags	ton	34.55 –	.....
Potassium sulphate, bags basis 90%	ton	45.85 –	.....
Double manure salt	ton	27.00 –	.....
Kainit	ton	7.22 –	.....

Crude Rubber

Para—Upriver fine	lb.	$0.23 –	.....
Upriver coarse	lb.	.18½ –	.....
Upriver caucho ball	lb.	.20½ –	.....
Plantation—First latex crepe	lb.	.26½ –	.....
Ribbed smoked sheets	lb.	.26½ –	.....
Brown crepe, thin, clean	lb.	.24½ –	.....
Amber crepe No. 1	lb.	.25½ –	.....

Gums

Copal, Congo, amber, bags	lb.	$0.10 –	$0.15
East Indian, bold, bags	lb.	.20 –	.21
Manila, pale, bags	lb.	.19 –	.20
Pontinak, No. 1 bags	lb.	.19 –	.20
Damar, Batavia, cases	lb.	.25 –	.....
Singapore, No. 1, cases	lb.	.32 –	.33
Singapore, No. 2, cases	lb.	.21½ –	.22
Kauri, No. 1, cases	lb	.64 –	.66
Ordinary chips, cases	lb.	.20½ –	.21½
Manjak, Barbados, bags	lb.	.09 –	.14

Shellac

Shellac, orange fine, bags	lb.	$0.64 –	....
Orange superfine, bags	lb.	.66 –	....
A. C. garnet, bags	lb.	.64 –	.65
Bleached, bonedry	lb.	.72 –	.73
Bleached, fresh	lb.	.60 –	....
T. N., bags	lb.	.61 –	.62

Miscellaneous Materials

Asbestos, crude No. 1, f.o.b. Quebec sh. ton		$325.00 –	$450.00
Asbestos, shingle, f.o.b., Quebec sh. ton		50.00 –	70.00
Asbestos, cement, f.o.b., Quebec sh. ton		17.00 –	20.00
Barytes, grd., white, f.o.b. mills, bbl. net ton		16.00 –	17.00
Barytes, grd., off-color, f.o.b. Balt. net ton		13.00 –	14.00
Barytes, floated, f.o.b. St. Louis, bbl. net ton		26.00 –	.....
Barytes, crude f.o.b. mines, bulk net ton		8.50 –	10.00
Casein, bbl., tech. lb.		.11½ –	.12½
China clay (kaolin) crude, No. 1, f.o.b. Ga. net ton		8.50 –	10.00
Washed, f.o.b. Ga. net ton		8.00 –	9.00
Powd., f.o.b. Ga. net ton		13.00 –	20.00
Crude f.o.b. Va. net ton		6.00 –	8.00
Ground, f.o.b. Va. net ton		13.00 –	19.00
Imp., lump, bulk net ton		15.00 –	20.00
Imp., powd. net ton		45.00 –	50.00
Feldspar, No. 1 f.o.b. N.C. long ton		6.60 –	7.75
No. 2 f.o.b. N.C. long ton		4.50 –	5.00
No. 1 soap long ton		8.50 –	.....
No. 1 Canadian, f.o.b. mill, powd. long ton		20.00 –	.....
Graphite, Ceylon, lump, first quality, bbl. lb.		.05½ –	.06
Ceylon, chip, bbl. lb.		.04½ –	.05
High grade amorphous crude ton		15.00 –	35.00
Gum arabic, amber, sorts, bags lb.		.13 –	.13½
Gum tragacanth, sorts, bags lb.		.50 –	.55
No. 1, bags lb.		1.35 –	1.40
Kieselguhr, f.o.b. Cal. ton		40.00 –	42.00
F.o.b. N. Y. ton		50.00 –	55.00
Magnesite, crude, f.o.b. Cal. ton		14.00 –	15.00
Pumice stone, imp., casks lb.		.03 –	.05½
Dom., lump, bbl. lb.		.05 –	.05½
Dom., ground, bbl. lb.		.05½ –	.06
Silica, glass sand, f.o.b. Ind. ton		2.00 –	2.50
Silica, sand blast, f.o.b. Ind. ton		2.25	3.50
Silica, amorphous, 200-mesh, f.o.b. Ill. ton		20.00 –	.....
Silica, glass sand, f.o.b. Ill. ton		1.75 –	3.00
Soapstone, coarse, f.o.b. Vt., bags ton		7.00 –	8.00
Talc, 200 mesh, f.o.b., Vt., bags, extra ton		8.00 –	8.50
Talc, 200 mesh, f.o.b. Ga., bags ton		8.00 –	9.00
Talc, 350 mesh, f.o.b. New York, grade A bags ton		22.00 –	.....

Mineral Oils

Crude, at Wells

Pennsylvania	bbl.	$3.25 –	$3.50
Corning	bbl.	1.65 –	.....
Cabell	bbl.	1.60 –	.....
Somerset	bbl.	1.60 –	.....
Illinois	bbl.	1.62 –	.....
Indiana	bbl.	1.63 –	.....
Kansas and Okla. under 28deg.	bbl.	.50 –	.....
California, 35 deg. and up	bbl.	.76 –	.....

Gasoline, Etc.

Motor gasoline, steel bbls	gal.	$0.17½ –	.....
Naphtha, V. M. & P. deod, steel bbls	gal	.16½ –	.....
Kerosene, ref. tank wagon	gal.	.15 –	.....
Bulk, W.W. delivered, N.Y.	gal.	.09 –	.....
Lubricating oils:			
Cylinder, Penn., dark	gal.	.26 –	.....
Bloomless, 30@31 grav.	gal.	.17½ –	.....
Paraffin, pale	gal.	.16 –	.16½
Spindle, 200, pale	gal.	.21 –	.21½
Petrolatum, amber, bbls	lb.	.03½ –	.04½
Paraffine wax (see waxes)			

Refractories

Bauxite brick, 56% Al_2O_3, f.o.b. Pittsburgh	1,000	$140–145
Chrome brick, f.o.b. Eastern shipping points	ton	45–47
Chrome cement, 40-50% Cr_2O_3	ton	23–27
40-45% Cr_2O_3, sacks, f.o.b. Eastern shipping points	ton	23.00
Fireclay brick, 1st. quality, 9-in. shapes, f.o.b. Ky. wks.	1,000	42–45
2nd. quality, 9-in. shapes, f.o.b. wks.	1,000	35–38
Magnesite brick, 9-in. straight (f.o.b. wks.)	ton	65–68
9-in. arches, wedges and keys	ton	80–85
Scraps and splits	ton	65
Silica brick, 9-in. sizes, f.o.b. Chicago district	1,000	50–53
Silica brick, 9-in. sizes, f.o.b. Birmingham district	1,000	50–53
F.o.b. Mt. Union, Pa.	1,000	42–45
Silicon carbide refract. brick, 9-in.	1,000	1160.00

Ferro-Alloys

Ferrotitanium, 15-18% f.o.b. Niagara Falls, N.Y. ton		$200.00 –	$225.00

Ferrochromium, per lb. of Cr, 1-2% C	lb.	$0 30	-.....
4-6% C	lb.	.12	-.....
Ferromanganese, 78-82% Mn, Atlantic seabd. duty paid	gr. ton	109.00	-.....
Spiegeleisen, 19-21% Mn..	gr. ton	40.00	-.....
Ferromolybdenum, 50-60% Mo, per lb. Mo	lb.	2.00 -	2.50
Ferrosilicon, 10-12%	gr. ton	43.00 -	50.00
50%	gr. ton	82.50 -	85.00
Ferrotungsten, 70-80%, per lb. of W	lb.	.88 -	.95
Ferro-uranium, 35-50% o U. per lb. of U	lb.	4.50	-.....
Ferrovanadium, 30-40% per lb. of V	lb.	3.50 -	4.00

Ores and Semi-finished Products

Bauxite, dom. crushed dried, f.o.b. shipping points	ton	$5.50 -	$8.75
Chrome ore Calif. concentrates, 50% min. Cr_2O_3	ton	22.00 -	23.00
C.i.f. Atlantic seaboard	ton	19.50 -	22.00
Coke, fdry., f.o.b. ovens	ton	5.00 -	5.50
Coke, furnace, f.o.b. ovens	ton	3.75 -	4.00
Fluorspar, gravel, f.o.b. mines' Illinois	ton	23.50	-.....
Ilmenite, 52% TiO_2	lb.	.00½-	.01
Manganese ore, 50% Mn c.i.f. Atlantic seaport	unit	.38 -	.42
Manganese ore, chemica (MnO_2)	ton	75.00 -	80.00
Molybdenite, 85% MoS_2, per lb. MoS_2 N. Y.	lb.	.80	-.....
Monazite, per unit of ThO_2, c.i.f., Atl. seaport	lb.	.06 -	.08
Pyrites, Span., fines, c.i.f Atl. seaport	unit	.11½-	.12
Pyrites, Span., furnace size c.i.f. Atl. seaport	unit	.11½-	.12
Pyrites, dom. fines, f.o.b. mines, Ga.	unit	.12	-.....
Rutile, 95% TiO_2	lb.	.10	-.....
Tungsten, scheelite, 60% WO_3 and over	unit	9.50 -	10.00
Tungsten, wolframite, 60% WO_3	unit	8.50 -	9.00
Uranium ore (carnotite) per lb. of U_3O_8	lb.	3.50 -	3.75
Uranium oxide, 96% per lb. U_3O_8	lb.	2.25 -	2.50
Vanadium pentoxide, 99%	lb.	12.00 -	14.00
Vanadium ore, per lb. V_2O_5	lb.	1.00 -	1.25
Zircon	ton	50.00	-.....

Non-Ferrous Metals

Copper, electrolytic	lb.	$0.12½-	$0.12½
Aluminum, 98 to 99%	lb.	.26 -	.27
Antimony, wholesale, Chinese and Japanese	lb.	.10½-	.10¾
Nickel, 99%	lb.	.26 -	.30
Monel metal, shot and blocks	lb.	.32	
Monel metal, ingots	lb.	.38	
Monel metal, sheet bars	lb.	.45	
Tin, 5-ton lots, Straits	lb.	.48¾	
Lead, New York, spot	lb.	7 90	
Lead, E. St. Louis, spot	lb.	7.983	
Zinc, spot, New York	lb.	.0672½	
Zinc, spot, E. St. Louis	lb.	.0637½	
Silver (commercial)	oz.	.63¾	
Cadmium	lb.	.75@ .80	
Bismuth (500 lb. lots)	lb.	2.55	
Cobalt	lb.	3.00-3 25	
Magnesium, ingots, 99%	lb.	.90-.95	
Platinum	oz.	122.00	
Iridium	oz.	275.00-300.00	
Palladium	oz.	85.00	
Mercury	75 lb.	60.00	
Tungsten	lb.	.90-.95	

Finished Metal Products

	Warehouse Price Cents per Lb.
Copper sheets, hot rolled	19.50
Copper bottoms	29.50
Copper rods	20 00
High brass wire	18.00
High brass rods	15.50
Low brass wire	20.00
Low brass rods	20.50
Brazed brass tubing	23.50
Brazed bronze tubing	25.00
Seamless copper tubing	23.50
Seamless high brass tubing	22.00

OLD METALS—The following are the dealers purchasing prices in cents per pound:

Copper, heavy and crucible	10.00 @10.25
Copper, heavy and wire	9.87½@10.00
Copper, light and bottoms	8.00 @ 8.25
Lead, heavy	6.62½@ 6.87½
Lead, tea	3.62½@ 3.87½
Brass, heavy	5.25 @ 5.50
Brass, light	4.50 @ 4.75
No. 1 yellow brass turnings	5.00 @ 5.12½
Zinc scrap	3.75 @ 4.00

Structural Material

The following base prices per 100 lb. are for structural shapes 3 in. by ¼ in. and larger, and plates ¼ in. and heavier, from jobbers' warehouses in the cities named:

	New York	Chicago
Structural shapes	$3.54	$3.54
Soft steel bars	3.54	3.54
Soft steel bar shapes	3.54	3.54
Soft steel bands	4.39	4.39
Plates, ¼ to 1 in. thick	3 64	3.64

Imports at Port of New York

January 11 to January 17

ACIDS—Cresylic—36 dr., Liverpool, W. E. Jordan & Bros.; 60 dr., Glasgow, Order. **Tartaric**—57 csk., Rotterdam, Order; 320 csk., Rotterdam, W. Benkert & Co. **Tar**—1 dr., Liverpool, Monsanto Chemical Works.

ALCOHOL — 1 bbl. butyl, Havre, De Mattia Chemical Co.; 1 bbl. do., Havre, Order; 13 dr. butyl and 1 bbl. amyl, London, Order; 124 dr. butyl, Bordeaux, Commercial Solvents Corp.; 125 bbl. denatured, Arecibo, C. Esteva.

AMMONIUM PERCHLORATE—300 keg, Liverpool, Order.

ANTIMONY REGULUS—250 cs., Hamburg, Order.

ANTIMONY ORE—440 bg., Antofagasta, W. R. Grace & Co.

ANTIMONY SULPHIDE—41 csk., Antwerp, L. H. Butcher & Co.

ARSENIC—45 csk., Antwerp, National Bank of N. Y.; 60 bbl., Antwerp, Schulz & Ruckgaber; 40 bbl., Antwerp, Order; 10 cs., London, Order.

BARYTES—50 bg., Bremen, Order; 42 bg., Hamburg, Innis, Speiden & Co.

CASEIN—835 bg., Buenos Aires, International Acceptance Bank; 834 bg., Buenos Aires, Bank of America; 154 bg., Hamburg, Aludinite Chem. Prod. Co.

CHALK—1,020 bg., Antwerp, Brooklyn Trust Co.; 715 bg., Antwerp, Guaranty Trust Co.; 400 bg., Antwerp, Irving Bank-Col. Trust Co.; 3,000 bg., Antwerp, Cooper & Cooper, Inc.; 1,000 bg., Antwerp, Order; 1,050 bg., Antwerp, Bankers Trust Co.

CHEMICALS—500 bg., Rotterdam, P. Uhlich & Co.; 30 csk. and 80 carboys, Rotterdam, Roessler & Hasslacher Chemical Co.; 514 bg., Glasgow, Brown Bros. & Co.

CHROME ORE—3,500 tons Paagoumene, M. M. Dennis & Co.

COAL-TAR DISTILLATE—90 dr., Liverpool, Order.

COLORS—16 csk. aniline, Antwerp, Geigy Co.; 11 csk. and 7 cs. do., Antwerp, American Exchange National Bank; 19 pkg. aniline, Rotterdam, H. A. Metz & Co.; 5 csk. do., Rotterdam, L. & R. Organic Products Co.; 34 csk. aniline, Havre, Ciba Co.; 21 csk. do., Havre, Carbic Color & Chemical Co.; 3 keg do., Havre, Irving Bank-Col. Trust Co.; 38 csk., Havre, Riechard-Coulston, Inc.; 3 pkg., Hamburg, Kuttroff, Pickhardt & Co.; 4 bbl., Hamburg, H. A. Metz & Co.; 6 pkg. aniline, Hamburg, Franklin Import & Export Co.; 136 pkg. aniline, Potterdam, Kuttroff, Pickhardt & Co.; 6 csk. aniline, Rotterdam, H. A. Metz & Co.; 13 csk. aniline, Rotterdam, Order; 34 csk., Havre, Ciba Co.

CORUNDUM ORE—615 bg., Rotterdam, National City Bank.

DEXTRINE—50 bg., Rotterdam, Brown Bros. & Co.; 250 bg., Rotterdam, Stein, Hall & Co.

DIVI-DIVI—150 bg., Maracaibo, E. J. Haley, Inc.

EPSOM SALT — 750 bg., Bremen, E. Suter & Co.; 262 bbl., Hamburg, Innis, Speiden & Co.

FERROCHROME—100 cs., Havre, International Ores & Metals Selling Corp.

FUSEL OIL—1 dr., Dunkirk, Order.

FULLERS EARTH — 450 bg., London, L. A. Salomon & Bros.; 100 bg., London, Gallagher & Ascher.

GLYCERINE—100 bbl. crude, London, Marx & Rawolle; 60 dr., St. Nazaire, Marx & Rawolle.

GUMS—340 bg. copal, Antwerp, Chemical National Bank; 233 bg. gum, Adelaide, Order; 207 bskt. copal and 222 bg. do., Macassar, Kidder, Peabody Acceptance Corp.; 202 bskt. copal, Macassar, International Acceptance Bank; 65 bskt. do., Macassar, American Exchange Nat'l Bank; 1,560 bskt. copal and 197 cs. do., Macassar, Order; 100 cs. damar, Padang, Catz American Co.; 891 bg. copal, Antwerp, Order; 412 bg. copal, Antwerp, Order.

IRON OXIDE—22 csk., London, Reichard-Coulston, Inc.; 13 csk., Antwerp, Order; 3 csk., Hull, L. H. Butcher & Co.; 35 csk., Hull, Order.

IRON SULPHATE—67 csk., Antwerp, Order.

LAMPBLACK—40 csk., Antwerp, L. H. Butcher & Co.

LITHOPONE — 20 cs., Rotterdam, P. Uhlich & Co.; 100 csk., Antwerp, A. Klipstein & Co.; 800 csk., Antwerp, Benjamin Moore & Co.

MANGANESE ORE—2,200 tons, Rio de Janeiro, U. S. Steel Products Co.

MAGNESITE—230 bbl. calcined, Rotterdam, Innis, Speiden Co.; 1,000 bg. and 46 csk. calcined, Rotterdam, H. J. Baker & Bro.; 87 bbl. and 106 bg., Rotterdam, A. Kramer & Co.

MYROBALANS — 2,594 pkt., Calcutta, National City Bank; 2,153 pkt., Calcutta, Order.

NAPHTHALENE — 1,752 bg., Antwerp, Order.

OILS—Cod—150 csk., St. Johns, National Oil Products Co.; 200 bbl., Aberdeen, J. D. Irwin. **China Wood**—50 bbl., London, Irving Bank-Col. Trust Co. **Linseed**—108 dr., Rotterdam, Int'l Merc. Marine Co. **Palm** — 8 dr., Antwerp, Oelrichs & Co. **Peanut**—40 bbl., Antwerp, Hummel & Robinson. **Rapeseed**—30 bbl., Rotterdam, Order; 275 bbl., Hull, J. C. Francesconi & Co.; 70 bbl., Hull, Order. **Waste**—100 bbl., Hull, J. C. Francesconi & Co.

PHOSPHATE — 1,700 bg., Rotterdam, Hollingshurst Co.

PLUMBAGO—156 bbl., Colombo, Brown Bros. & Co.; 93 bbl., Colombo, G. F. Pettinos; 199 bg., Colombo, H. W. Peabody & Co.; 75 bbl., Colombo, N. Y. Trust Co.; 552 bg., Colombo, Order.

POTASSIUM SALTS—589,680 kilos manure salt, 167 bg. kainit, 4,800 bg. muriate and 1,230 bg. sulphate, Antwerp, Society Comm. des Potasses d'Alsace; 20 csk. bicarbonate, Antwerp, Order; 400 csk. chlorate, Antwerp, Chemico-Electrometallurgical Prod. Trading Corp.; 17 csk. prussiate, Liverpool, Order.

QUEBRACHO—3,058 bg., Buenos Aires, Fourth Atlantic National Bank of Boston; 10,049 bg., Buenos Aires, Tannin Corp.

SHELLAC—33 cs., Rotterdam, G. T. Gerlach; 50 bg., London, Ralli Bros.; 300 bg., Calcutta, Anglo-South American Bank; 100 bg., Calcutta, A. Helmrath, Inc.; 200 bg. Calcutta, British Oversea Bank; 55 bg. garnet, Hamburg, Kasebier-Chatfield Shellac Co.; 100 bg., London, Dohen, Grimm & Co.

SODIUM SALTS—119,095 bg. nitrate (weight 8,704 tons; 1,000 tons to be discharged at Norfolk), Mejillones, A. Gibbs & Co.; 14,498 bg. nitrate, Antofagasta, Wessel, Duval & Co.; 1,617 bg. nitrate, Iquique, E. I. Du Pont de Nemours Co.; 11,313 bg. nitrate, Iquique, Wessel, Duval & Co.; 224 cs. cyanide, Havre, C. Hardy & Ruperti; 250 cs. do., Havre, Meteor Products Co.; 24 bbl. fluoride, Hamburg, Guaranty Trust Co.; 2 csk. cyanide, Rotterdam, Order; 5,673 sk. nitrate, Antofagasta, W. R. Grace & Co.; 8,813 sk. nitrate, Iquique, W. R. Grace & Co.; 156 dr. sulphide, Antwerp, E. M. Sergeant & Co.; 43 bbl. phosphate, Antwerp, A. Klipstein & Co.; 44 bbl. bifluoride, Hamburg, Innis, Speiden & Co.

STARCH—1,050 bg. potato, Rotterdam, Stein, Hall & Co.

SILVER SULPHIDE—474 pkg., Arica, Hochschild & Co.; 7 cs., South Pacific Ports, Goldsmith & Co.

UMBER—51 csk., Hull, L. H. Butcher & Co.

ULTRAMARINE BLUE—20 csk., Antwerp, J. Campbell & Co.

VANADIUM ORE — 13,700 sk., Callao, Vanadium Corp. of America.

VENETIAN RED—100 csk., Liverpool, J. L. Smith & Co.

VERMILION—20 pkg., London, Pomeroy & Fischer; 7 csk., London, Order.

WAXES—56 bg. carnauba, Bahia, Bank of London & South America; 75 cs. bleached bees, Rotterdam, Order; 225 bg. montan, Bremen, W. Schall & Co.; 34 pkg. bees, Santiago de Cuba, Order; 951 bg. montan, Hamburg, Irving Bank-Col. Trust Co.; 40 bg. bees, London, Order; 97 cs. spermacetti, Glasgow, Order.

WOOL GREASE — 100 bbl., Antwerp, Mechanics & Metals National Bank; 100 cs., Antwerp, Borne, Scrymser & Co.; 10 bbl., Liverpool, E. M. Sergeant & Co.; 90 bbl., Hull, National City Bank.

ZINC OXIDE—50 bbl., Antwerp, Reichard-Coulston, Inc.; 50 csk., Antwerp, E. M. & F. Waldo; 265 bbl., Antwerp, Philipp Bros.